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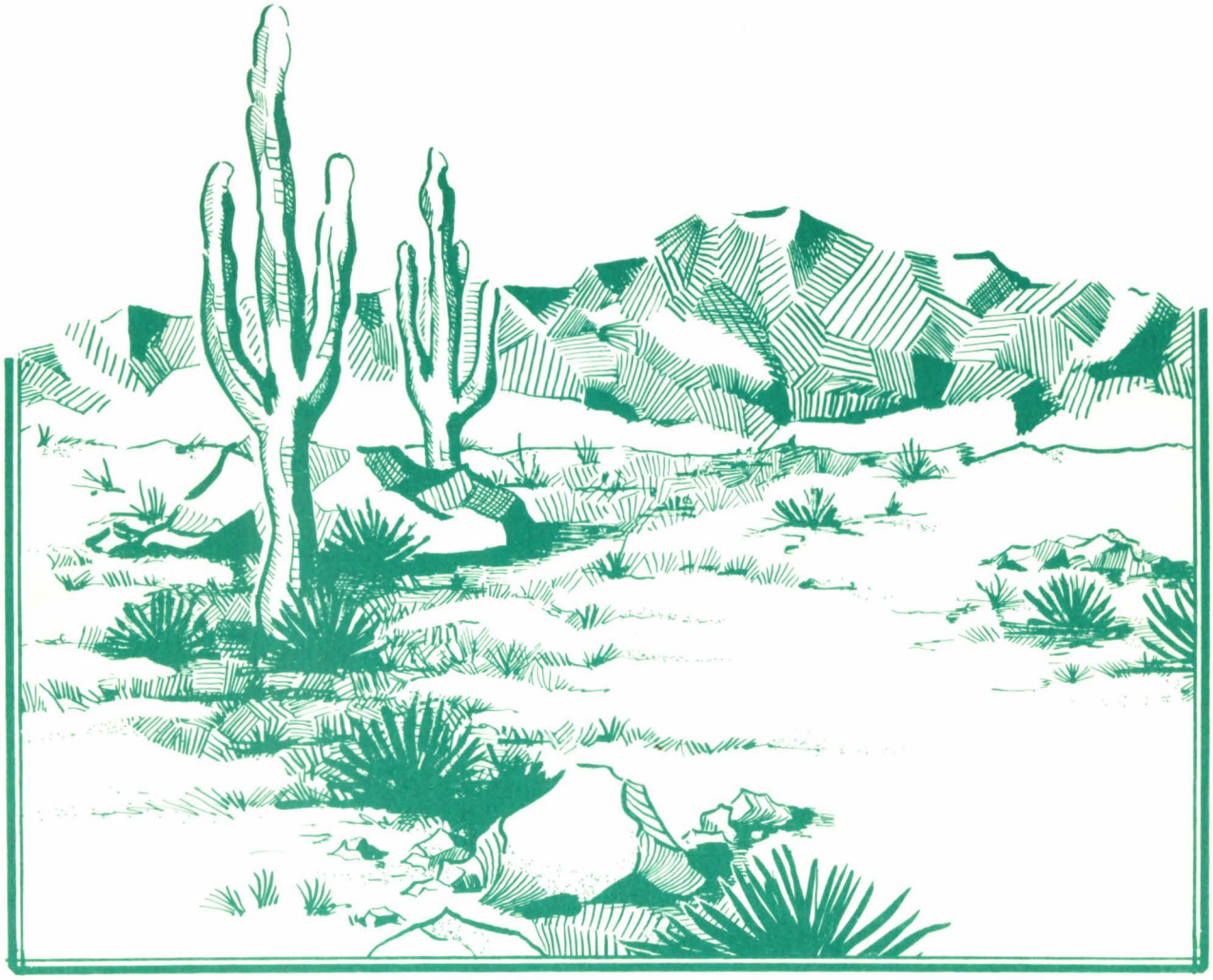
**Forest
Service**

Southwestern
Region

September 1984

Progress Report

RESEARCH NATURAL AREAS



Recommended representations for important ecosystems on National Forest System Land in the Southwestern Region.

Acknowledgement

The RNA program functions on an ad hoc basis. People with a commitment to improving resource management make the program successful.

The following list of Forest Service people made key contributions in the current reported progress:

Mike Borens
Ken Dunstan
Gary Davis
Stet Edmunds
Greg Goodwin
Paul Gordon
Vearle Haynes
Richard Krebill
Penny Price
Don Renton
Harry Severtson
Lee Singer
Dave Stewart
Hugh Thompson
Carl D. Warrick
Cory Wong
Vern Zarlingo

RNA Committee

John W. Russell
James C. Overbay
Ed F. Wicker
Larry J. Schmidt

RNA Task Group

Earl F. Aldon
Reggie A. Fletcher
William H. Moir
Robert C. Szaro
William D. Zeedyk

ROCKY MOUNTAIN RESEARCH STATION LIBRARY
FORT COLLINS CENTER
240 W PROSPECT RD
FORT COLLINS, CO 80526-2098

United States Department of Agriculture | Forest Service | Region 3 | 517 Gold Avenue, SW Albuquerque, NM 87102

Reply To: 4060 Research Facilities **Date:** SEP 14 1984

Subject: Progress Review of Region 3 Research Natural Areas

To: RNA Committee

The enclosed Research Natural Area (RNA) Progress Report, summarizes the accomplishments and current status of RNA planning on lands administered by the USDA Forest Service in Region 3. Previously a briefing paper in March 1981, described the status of the RNA program and reviewed existing policy and direction. In addition, that report discussed existing RNA's, previously studied areas, and potential areas for each National Forest.

The RNA Committee, working through the Task Group, has been reviewing the RNA program on a Forest-by-Forest basis, in conjunction with the Forest planning process. Positive interest and support at all levels of the organization produced many important and viable RNA candidates. Our procedure has been: (1) Inform each Forest about the scope and purpose of the Regional RNA program, (2) Suggest areas where they can provide ecosystem representations (as given in Tables 3-1 of the Regional Guide), (3) Undertake field reviews for areas proposed, and (4) Recommend areas to be considered in the preferred alternative of Forest plans.

In March 1981, Region 3's ecosystems were under-represented by established RNA's. Only two areas had been established on National Forests in New Mexico, and 12 in Arizona. Considering the very high diversity of Southwestern ecosystems, this total of 14 established RNA's did not reflect the Region's needs or opportunities. Public input to the Regional planning process identified RNA representation as a significant issue. Region 3 responded by adopting an improved RNA classification (Tables 3-1 of the Regional Guide) and by emphasizing the need for RNA representation in the Forest planning process, via its "RNA Task Group" and "RNA Contacts" at each Forest.

Nationally, only a few new RNA's have been recently established. This is because most Regions have incorporated the RNA establishment process into the overall Forest planning process. We have made considerable progress in identifying specific areas during the past 24 months. Reviews and recommendations for the current round of planning have been conducted for all National Forests in the Southwestern Region. However, the National Grasslands were not considered in this round of planning because of their unique management requirements.

Larry J. Schmidt

LARRY J. SCHMIDT
Group Leader, RNA Task Group

Enclosure

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SOUTHWESTERN REGION RESEARCH NATURAL AREA PROGRAM

Status Report--July 1984

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SOUTHWESTERN REGION RESEARCH NATURAL AREA PROGRAM

Status Report--July 1984

ABSTRACT

Research Natural Area (RNA) establishment proposals for the Southwestern Region have been under review during the last 24 months. The Regional RNA Committee performed the review working through a seven member Task Group. At the start of the review, the Southwestern Region had 14 established RNA's, but many ecosystems of widespread importance on National Forest lands were not represented within these areas. The RNA Committee proposes an additional 26 RNA's to be included within Forest Plans in the preferred alternative for meeting Regional and National RNA requirements. The report briefly describes the proposed RNA's, continuing program needs, and responds to common questions. The search continues for additional areas to represent the diversity in the pinyon-juniper and several other ecosystems.

The proposed RNA's include difficult to obtain representations in high-use ecosystems. Reviews with Forest representatives for possible on-ground locations succeeded in finding proposed RNA locations which minimized resource management conflicts. The total acreage of established RNA's is 11,500 about .05 percent of total National Forest lands in the Southwestern Region (exclusive of National Grasslands). The inclusion of the proposed new RNA's, plus some boundary adjustments on several established RNA's, would produce a net increase to about 29,800 acres. This allocates less than 15 acres out of every 10,000 acres of National Forest System lands or RNA purposes.

KEYWORDS: Ecosystems, Research Natural Areas, Arizona, New Mexico, Forest Planning, 4063.

EXISTING AND PROPOSED RNA's

The review of Forests is now essentially complete.

Tables 1-2 summarize areas indicated as RNA's. The classification of Table 1 is an update of the series-level classification in the Regional Plan. The ecosystem representations are based upon biotic communities (Brown 1983) and cross-walked to National classifications by Kuchler and the Society of American Foresters. To integrate with Forest planning and mapping, a Terrestrial Ecosystem Survey designation for each ecosystem is also given (USDA Forest Service, Carleton and Brown 1983).

Fourteen established RNA's are listed in Table 1 within the major ecosystems identified for representation. For example, Pole Bridge Canyon RNA features "southern Arizona pines" as an important reason for its establishment (in 1931). The pines within the area are mostly Pinus ponderosa var arizonica, P. leiophylla (Chihuahuan pine), and P. engelmanni (Apache pine) falling within the pine-oak classification. The total acreage within the 14 existing RNA's is 11,500, or 0.051 percent of National Forest lands in Region 3 (not including National Grasslands). The incompleteness of ecosystem representation within the existing RNA system of Region 3, at the onset of this review period, is also revealed by the gaps identified in Table 1. This was also a major concern of the majority of those responding to the draft Regional Guide.

Proposed RNA's in Table 1 were reviewed and recommended for inclusion in the preferred alternative of Forest Plans to help achieve Regional goals for the RNA program. All of these areas recommended for establishment fill deficiencies in the Southwestern Region's network of needed ecosystem representation. A summary of each proposed RNA is given in the Appendix of this report. The total acreage of both proposed and existing RNA's is about 29,800 or about .15 percent of National Forest lands in Arizona and New Mexico. Most RNA's are between 300-1200 acres (average of 740 acres).

The proposed RNA's of Table 1 contain mostly "high-use" ecosystems that are widespread on Forest lands outside the RNA's. Haufer Wash RNA, for example, is within the 126,700 acre Tonto Basin grazing allotment. This RNA, which contains about 400 acres of desert grassland and about 250 acres of desert shrub, serves a valuable benchmark function in an arid grazing region where 91,000 acres of desert grassland and 50,000 acres of desert shrub are under livestock grazing programs in six allotments (in addition to the Tonto Basin allotment) within the Tonto Basin District.

The proposed RNA's contain examples of ecosystems intensely managed or manipulated in the Southwest. These resource production ecosystems need representation in the RNA system because of their diversity, typicalness, stage of succession, and opportunity to provide monitoring benchmarks for Forest Plans.

Although most of the proposed RNA's contain ecosystems of typical and widespread management concern, the areas proposed (see Appendix A) were usually in locations that minimized possible management conflicts. In some cases, the Forest planners had already resolved management issues.

Table 2 summarizes existing and proposed areas by Forests in Arizona and New Mexico. We have completed review in New Mexico Forests suggesting 14 additional areas. The Buck Mountain proposed RNA has had a long history (since 1968) of review and consideration under Multiple Use Planning. Because of this, we recommend giving priority to an establishment proposal for this area when the Forest Plan becomes the operational basis of management on the Lincoln National Forest.

Arizona has 12 proposed RNA's and another currently under consideration (Table 2). Of these we recommend that the RNA designate, Picket Post Mountain, receive priority for early submission as an establishment proposal for the Chief's signature when the Forest Plan becomes operational on the Tonto National Forest.

During the interim period until Forest Plans are approved, all of the RNA designates of Table 2 should be managed by regulations provided in FSM 4063.3. This insures that the integrity of these areas for benchmark and research purposes will be maintained until the Chief has had opportunity to formally review and establish them as RNA's.

The Forests have been very cooperative in their participation in the RNA program. They generally understand the contribution that RNA's (as research facilities) make to Forest management. The questions or issues raised by the various Forest staffs (Appendix B) during our review were constructive and helped in promoting the search, inspection, and recommendations for the best possible representative ecosystems.

The Regional RNA Committee inspected, but did not recommend in this round of planning, a number of possible RNA sites indicated in Table 3. The Task Group and staffs from each Forest performed this screening. Guidelines for screening are given in FSM 4063, the Regional Guide (especially Tables 3-1) and in consultation with local researchers, biologists, and other authorities (Moir 1972). Some of the major reasons for not choosing suggested RNA's, after site inspection, are briefly stated in Table 3. As a result of this period of RNA review, the backlog of suggested inclusions for RNA's in the Southwestern Region has been considerably reduced. We do not imply that other candidate RNA's will not surface in the future--our Forest lands are simply too diverse. Indeed, the Southwestern Region still has some gaps and deficiencies in ecosystems yet to be represented in its RNA system, as discussed below.

DEFICIENCIES AND GAPS

Tables 1 and 2 reveal that the Region's RNA program has made substantial progress in meeting the objective of providing a network of examples of important forest, shrubland, grassland, alpine, desert, and riparian ecosystems. But some deficiencies and major gaps still exist. Some merit special consideration because of their extent or importance on lands administered by the Forest Service in the Southwest (Refer also to Table 1). The discussions which follow highlight only the more obvious of Region 3's RNA deficiencies. We hope that some of these can be eliminated as our review continues in 1984.

Coniferous Forests. Generally our Forest ecosystems are becoming more adequately represented within the Region's RNA network. High elevation spruce-fir forests have become increasingly important in contributing to the Region's future timber supply. At their southern distribution in the Rocky Mountain Region, we need at least one further representation of the subalpine forest in the mountains of northern New Mexico. The ecosystem should be of the Abies lasiocarpa/Vaccinium myrtillus habitat type because that is most common and representative of our managed high elevation Forests.

Alpine Tundra. Little Costilla Peak contains a good example of "dry" tundra fellfield but not the array of alpine tundras at their southern Rocky Mountain limits. A suggested area within the Wheeler Peak Wilderness area provides additional alpine habitats including tundra wet meadow Regional requirement (211.5). Location of a possible RNA there, or in another suitable location, needs further consideration.

Grassland. Some of our most important grazing lands are still not represented by examples within the RNA network.

For example, the Great Plains Grasslands need representation for research purposes. Shortgrass prairies (often known as blue grama-buffalo grass) are the bread and butter of a vast livestock industry from the northern to southern Great Plains. With depletion of the Ogalalla Aquifer in prospect, native pasture assumes increasing importance in the future. The Kiowa or Rita Blanca National Grasslands offer our best possibilities.

Woodland. About 8 million acres of National Forest lands in Region 3 consist of woodland vegetation--primarily pinyon-juniper and juniper savannas. Its commercial importance is suggested by the observation that nearly 65 percent of livestock grazing capacity is borne within this type. There are similar intense and growing requirements for fuelwood, recreation (primarily hunting) type conversion (to seral grasslands) and rehabilitation. There is also high geographical diversity within Region 3 woodlands. For example, there are three species of pinyon and seven species of juniper. Woodlands south of the Mogollon Rim contain numerous species of evergreen oaks and other plants occurring as northern outliers of rich Sierra Madrean flora, and forming a truly unique element of the Coronado and Tonto National Forests.

The Region remains critically short of RNA's in the encinal (evergreen oak woodland) pinyon-juniper, and juniper savanna ecosystems (Table 1). Minimally disturbed areas are hard to find or are usually already committed to some degree of resource utilization which precludes designating them for research purposes and benchmark areas. Yet the woodland ecosystems are doubtless among Region 3's most serious deficiency in the present RNA network. In view of its importance, diversity, and research-management interest, the network should include several additional pinyon-juniper, a juniper savanna, and at least one other encinal (preferably a Mexican blue oak) ecosystem.

Riparian. As yet, there are no montane narrow-leaf cottonwood ecosystems within our RNA network. Perhaps these are more likely to be found within Region 2, but the search for this riparian ecosystem within our own network

should continue. Similarly broad-leafed cottonwood ecosystems (223.21) are urgently needed within the Southwestern Region RNA system. These low elevation riparian forests are in great need of protection of their genetic resources and as benchmark controls in view of the high degree of utilization and alteration in the Southwest. Finally, the mixed broadleaf ecosystems (223.22) are so diverse (including Arizona sycamore, walnut, Arizona alder, Southwestern chokecherry, broad and narrowleaf cottonwoods and their occassional hybrids, velvet ash, and other deciduous trees) and so limited of acreage on National Forest lands that other RNA representations should be considered.

THE JOB AHEAD

A number of tasks still confront the RNA effort in the Southwest. Foremost, we feel, is the continuing task of looking for and finding suitable areas for inadequately represented ecosystems (as noted in the previous section). A 12 step process is followed in establishing RNA's. The first four steps are important for screening proposals and identifying those with true potential. The process includes the following steps:

Step 1: Initial screening of proposals made by outside groups and the Forest and Regional Office.

Step 2: Assessment of the proposals in the Forest AMS. Documentation in the planning file of criteria and considerations evaluated.

Step 3: On-the-ground review of proposed areas by the Regional Research Natural Area Task Group.

Step 4: Inclusion in the Forest Plan of areas considered suitable for establishment by the Regional RNA Task Force.

These first four steps are already operational within the Region and seem to be working well. However, more emphasis needs to be given to brief documentation in step two.

Step 5: After areas are designated for establishment in Forest Plans, we must prepare establishment reports in accord with FSM 4063.41. Members of the RNA Task Group can be called upon for assistance. Following this step are a series of steps toward establishment which can proceed after the decision is made on each Forest Plan.

Step 6: Submit to the RNA Committee for a technical review and approval of the proposal.

Step 7: Return report to Forest Supervisor for his review.

Step 8: Submit to Resource Staff in the Regional Office for comment.

Step 9: Transmit establishment report to Regional Forester for his review and recommendation to the Chief.

Step 10: Transmit to Rocky Mountain Station for review by the Director and recommendation to the Chief.

Step 11: Submit to the Chief for his approval process.

Step 12: After approval by the Chief, make appropriate public announcements of establishment, identify the boundaries on-the-ground where necessary, and assign a research coordinator for the area.

Data collection within RNA's is needed to show their resources available for study (species lists, soil types, etc.). Descriptive reports can be prepared for scientists, educators, and Forest staff (see for example, Peterson and Rasmussen 1983, Smith 1974).

Publications concerning RNA's should be available through coordination with the Rocky Mountain Station, State agencies, and the Forests concerned. These publications are our important source of information for management. An example of publication of initial findings in one of our RNA's is the descriptive report by Rominger and Paulik (1983).

All of our RNA's need management programs. Prescriptions consistent with FSM 4060 should be worked on by Forest LMP Staff in cooperation with the Rocky Mountain Station and other interested scientific consultants (such as local universities). In some of the RNA's, the most immediate concern is the degree of protection needed. Among other management concerns are such influences as the role of fire, grazing by large ungulates, or other periodic or episodic events that are considered a "natural" process in maintaining stability or bringing about succession. For example, some of our forested RNA's must be planned with respect to possible insect epidemics such as spruce budworm outbreaks. Should control programs be implemented in order to protect spread to adjoining Forests, or should sanitary and other preventive measures be taken to avert an outbreak possibility? Such management considerations, consistent with FSM 4063, will involve a greater portion of the RNA Committee's and Forest Planning Staff's time, in the foreseeable future, as the Southwestern Region's RNA program nears completion in terms of represented ecosystems.

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Research Natural Area Committee and Task Group

Research Natural Area Committee	Title and Location 1/	Phone
John W. (Bill) Russell (LMP)	Chairman, Research Natural Area Committee 4/	8-476-3210
Dr. Ed. F. Wicker	Assistant Director, RMS, Fort Collins 3/	8-323-1275
James C. Overbay	Deputy Regional Forester, Resources	8-476-3303
Larry J. Schmidt	Assistant Director, Soil & Water (Task Group Leader)	8-476-3254
Task Group		
Earl Aldon	Ecologist, Rocky Mountain Station 2205 Columbia S.E. Albuquerque, New Mexico 87106	8-474-1043 or-2834
Reggie Fletcher	Regional Botanist	8-474-2428
Dr. Will Moir	Regional Ecologist	8-474-2428
Robert C. Szaro	Habitat Criteria Development for Southwestern Wildlife 2/	8-261-4365
Bill Zeedyk	Director, Wildlife	8-476-3260

1/ All addresses are U.S. Forest Service, 517 Gold Avenue, SW, Albuquerque, NM 87102 unless otherwise indicated. Commercial number (505) 842 + 4 digit No.

2/ Forestry Sciences Laboratory, Arizona State University Campus, Tempe, AZ 85281

3/ 240 West Prospect, Fort Collins, CO 80526

4/ Phone numbers are FTS unless preceded by the area code.

TABLE 1: Established and candidate Research Natural Areas on lands administered by Region 3, USDA Forest Service, November 1983. Ecosystems are designated by biotic communities (Brown 1983), Kuchler (1964), Society of American Foresters (SAF), and Terrestrial Ecosystem Survey (U.S. Forest Service 1983) Classifications.

DESERT	Existing RNA's	Proposed RNA's	Forest
154.11 Creosotebush-bursage; K-042 LSQ: Aridic/hyperthermic-Franseria deltoidea	Bush Hwy		Tonto
154.12 Paloverde-Mixed cacti; K-043 LSW: Ardic/thermic-Carnegia gigantea		Picket Post Mt.	Tonto
153.21 Creosotebush-Tarbush; K-044 HSM: Ardic/thermic-Acacia vernicosa	a	a Sycamore Canyon	None Coronado
STEPPE			
144.22 Sagebrush; K-038 LSC: Aridic/Mesic-Artemisia tridentata			
143.12 Grama Tobosa; K-058 LSW: Aridic/thermic-Hilaria mutica	Elgin	Haufer Wash	Tonto Coronado
143.11 Scrub-grassland HSM: Ustic/mesic - Nolina mocrocarpa		Rabbit Trap	Gila
142.11 Bluestem; K-069, K-070 HSC: Ustic/mesic-Andropogon gerardi			
142.12 Grama "short grass", K-065 HSC: Ustic/mesic-Buchloe dactyloides			
142.12 GRAMA-GALLETA; K-053 HSC: Ustic/mesic-Hilaria Jamesii		Bernalillo	Cibola
152.13 Blackbrush; K-039 LSC: Aridic/mesic-Coleogyne ramosissima	a	a	
152.15 Winterfat LSC: Aridic/mesic-Eurotia lanata	a	a	
141.41 Rocky Mt. Subalpine grassland HSC: Udic/cryic-Festuca thurberi		Canada Bonito	Santa Fe
141.41 Rocky Mt. montane grassland HSC: Ustic/frigid-Festuca arizonica		Garland Prairie Escudilla Mt.	Kaibab Apache
241.7 & 242.4 WET MEADOWS Udic/frigid & cryic-Carex awuatilis	Phelps Cabin	McCrystal Meadow	Apache Carson
SHRUBLAND			
133.31 SHRUB OAK; K-032 LSW: Aridic/mesic-Quercus turbinella		Buckhorn Mt.	Tonto
133.34 Mountain mahogany HSM: Ustic/mesic-Cercocarpus montanus		Guadalupe Mt.	Lincoln
WOODLAND			
123.31 ENCINAL; K-031, SAF 241 HSM: Ustic/mesic-Quercus oblongifolia			Coronado
123.32 Oak-Pine; SAF 241 HSM: Ustic/mesic-Pinus leophylla	Pole Bridge Canyon		Coronado
123.52 Arizona cypress; SAF 240 LSW: Ustic/mesic-Cupressus arizonica glabra	Casner Canyon		Tonto

122.41 PINYON-JUNIPER; K-023, SAF 239 HSC, LSC: Ustic/mesic-Pinus edulis		Wildcat Canyon Largo Mesa	Sitgreaves Gila
122.41 JUNIPER SAVANNA; K-023 HSC: Ustic/mesic-Juniperus monosperma		Mesita Ladrones	Santa Fe
121.32 Bristlecone pine-limber pine; SAF 219,209 HSC, LSC: Udic/cryic-Pinus aristata	San Francisco Peaks	Middle Poinil Creek	Carson Coconino
CONIFEROUS FOREST			
122.32 PONDEROSA PINE; K-019, SAF 237 Ustic/frigid, warm-P. ponderosa var arizonica	Santa Catalina		Coronado
122.32 PONDEROSA PINE; K-019, SAF 237 Ustic/frigid, cool - Pinus ponderosa v. scopulorun	G. A. Pearon Monument Canyon	Rocky Gulch	Coconino Santa Fe
122.31 MIXED CONIFER; K-018, 019; SAF 210, 216, 217, 239 Udic/frigid-Abies concolor	Goudy Canyon Butterfly Peak	Haynes Canyon	Coronado Lincoln
222.31 Blue Spruce; SAF 216 Udic/frigid-Picea pungens	Hayground Creek	Little Water Canyon	Cibola Apache
121.31 SPRUCE-FIR; K-021, SAF 206, 211 Udic/cryic, cold-abies lasiocarpa	San Francisco Peaks	Upper Bonito Creek	Coconino Lincoln
121.31 SPRUCE-FIR; K-020 Udic/cryic, warm-A. lasiocarpa, Picea pungens		North Fork Thomas Creek. Arellano Canyon	Apache Carson
ALPINE TUNDRA			
111.5 Rocky Mt. alpine tundra; K-052 Udic/pergelic-Carex elynoides		Little Costilla Peak	Carson
211.5 Rocky Mt. alpine tundra; Udic/pergelic-Salix arctica			
221.31 Boreal riparian Udic/cryic-Alnus tenuifolia	a	a	
DECIDUOUS FOREST			
222.31 ROCKY MOUNTAIN RIPARIAN; SAF 216 Udic/frigid-Populus angustifolia			
222.32 Mixed Broadleaf; Udic/frigid-Acer grandidéntatum	Oak Creek Canyon	Parker Creek	Coconino Tonto
223.21 Cottonwood-willow; SAF 235 Ustic/mesic-Populus fremontii	Gila River		Gila
223.22 Mixed broadleaf; SAF 240 Ustic/mesic-Platanus wrightii	Goodding	West Clear Creek Turkey Creek	Coconino Gila Coronado
231.61 & 232.31 Riparian scrub Udic/frigid & cryic-Salix bebbiana	a	a	

a/ Minor ecosystems on National Forest lands.

Table 2. Existing and Proposed Research Natural Areas by Forest and State, Region 3, December 1983.

ARIZONA	Total	Established RNA	Proposed RNA
Tonto	6	Bush Highway (488)[a/] Casner Canyon (565)	Upper Forks Parker Cr. (950)[b/] Haufer Wash (600) Picket Post Mountain (1200) Buckhorn Mountain (2700)
Ccronado	7	Butterfly Peak (1000) Goudy Canyon (560) Pole Bridge Canyon (565) Santa Catalina (890) Elgin (290) Goodding (545)	Sycamore Canyon (1470) (Canelo) (350) c/
Coconino	5	Oak Creek (1717) G.A. Pearson (154) San Francisco Peaks (1309)	Rocky Gulch (960) West Fork Clear Creek (700)
Apache/ Sitgreaves	5	Phelps Cabin (312)	Escudilla Mountain (909) Wildcat Canyon (513) Hay Ground Creek (316) North Fork Thomas Creek (500)
Kaibab	1		Garland Prairie (350)
Prescott	0		
NEW MEXICO			
Lincoln	3		Buck Mountain (727) Haynes Canyon (610) Guadalupe Mountain (827)
Cibola	2		Little Water Canyon (950) Bernalillo Watershed (1120)
Santa Fe	3	Monument Canyon (640)	Cañada Bonito (300) Mesita de los Ladrones (500)
Carson	4		Little Costilla Peak (590) Arellano Canyon (900) Clayton Pass (300) McCrystal Meadow (590)
Gila	4	Gila River (402)	Turkey Creek (1335) Largo Mesa (300) Rabbit Trap (300) (Fort Bayard) (400) c/
TOTAL	24 16	(Arizona) (New Mexico)	

a/ Numbers in parenthesis are approximate acres
b/ Sierra Ancha Experimental Forest
c/ Currently under review

TABLE 3. Suggested research natural areas not recommended in the present round of Forest planning, December 1983.

AREA	FOREST	ECOSYSTEM	REASON[1/]
Windy Canyon	Lincoln	Pinyon-juniper	a
Elder Canyon	"	Pinyon-juniper	a,b
Capitan	"	Interior Douglas-fir	a,f
Cloudcroft Exp. Forest (except Haynes Cany.)	"	Mixed conifer	c
Pajarito Mountain	Santa Fe	Thurber fescue	c
Duran Canyon	Carson	Blue spruce	c
Upper Cabresto Creek	"	Engelman spruce	c
Cerro Mojino	"	Pinyon-juniper	a,b,e
Bluewater Creek	Cibola	Ponderosa pine	d
Penasco	"	Creosote-Tarbush	a,d
Bear Mountains	"	Grama-Galleta	c
McComas Peak	Gila	Pinyon-juniper	a
Sandy Point-Willow Mt.	"	Corkbark fir	f
Iron Creek Mesa	"	Ponderosa pine	f
Aqua Fria Mesa	"	Montane grassland	e
Camp Verde	Coconino	Creosotebush	b,f
Sunnyside Canyon	Coronado	Mexican blue oak	b,c
Scotia Canyon	"	Chihuahua pine	f
Blue River	Apache	Cottonwood-willow	e
Upper Wood Canyon	"	Arizona cypress	f
Mineral Springs	"	Wet meadow	d
Seven Springs	"	Arizona fescue	b,c
Basin Lake	"	Wet meadow	d
Forest Lakes	Sitgreaves	Ponderosa pine	f
Double Cabin	"	Mixed conifer	d
House Rock Valley	Kaibab	Big sagebrush	f
Crane Lake	"	Wet meadow	d
Franks Lake	"	Karst sink holes	d
North Canyon	"	Mixed conifer	a,f

1/ Reasons were elaborated in reports to the Forests concerned. They are summarized as follows:

a - not representative or typical
b - not meeting requirements of minimum disturbance or benchmark potential
c - serious management conflicts including inability to adequately protect
d - area too small; possible range reference, botanical, wildlife, geological, or historical area
e - hold as possibility while search for more suitable area continues
f - non-essential for RNA program; no compelling reason at this time for research natural area designation.

APPENDIX A. Synopsis of Proposed Research Natural Areas in Region 3.

This synopsis includes only those RNA's reviewed by the Regional RNA Committee during the period from March 1981 to December 1983. For descriptions of the remaining established RNA's see Smith (1974) and Peterson and Rasmussen (1983). The boundaries and acreages described on the maps are approximate. Some will vary in size according to alternatives considered in Forest Plans. Others will need small boundary adjustments to conform to RNA standards and provide a manageable unit. The approximate scale for the reference maps is 1:24,000 except for Buckhorn Mountain which is approximately 1:36,000.

NORTH FORK THOMAS CREEK RESEARCH NATURAL AREA

Apache National Forest, Alpine District, Arizona

Primary Ecosystem: 121.31 spruce-fir forest

500 acres (200 ha)

This area contains a pristine example of the Picea engelmannii/Senecio cardamine habitat type (Fitzhugh et al 1983). The area has a long history (18 years) of watershed and silviculture research. It was first suggested as a research natural area in 1973. At the time of that proposal the area was already receiving considerable research. The North Fork was programmed to become a watershed treatment once instrumentation and calibration were completed. This is no longer a problem so far as maintaining the North Fork as a natural area. Today, the Forest Service has a sizeable investment in research here. The watershed weirs on each fork of Thomas Creek are still functional and operative.

Among the recent research publications are a fire history study (Dieterich 1983) and 5-year study of stand development and tree growth (Gottfried 1978). For detailed description of the Forest, see Moir and Ludwig (1979) or Fitzhugh et al (1983).

References:

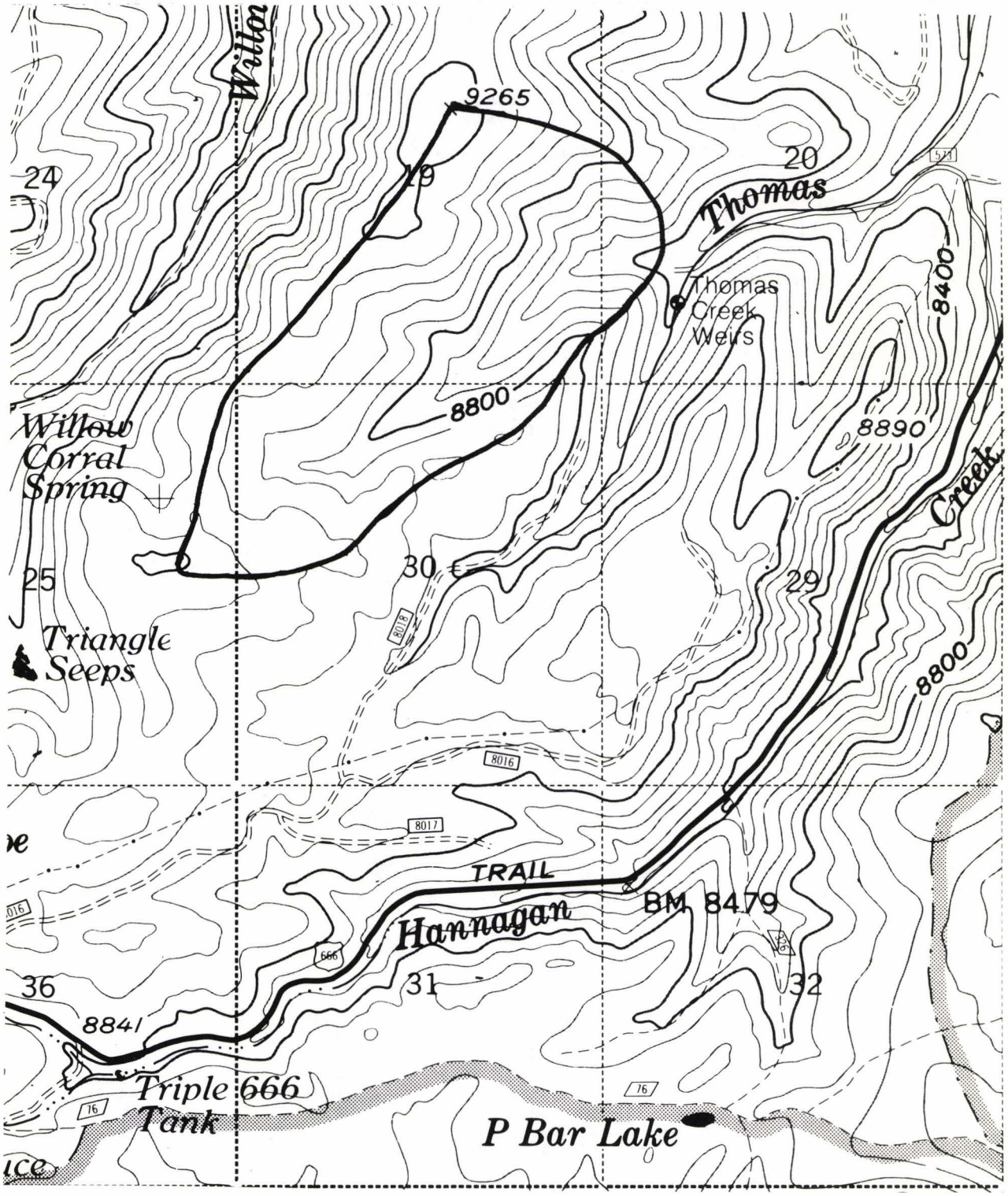
Dieterich, John H. 1983. Fire history of Southwestern mixed conifer: a case study. Forest Ecol. and Management 6: 13-31.

Fitzhugh, E. Lee, W. H. Moir, John A. Ludwig, and Frank Ronco, Jr. 1983. Forest habitat types in the Apache, Gila, and part of the Cibola National Forests. USDA Forest Serv. Gen. Tech. Rep. RM- (in preparation).

Gottfried, Gerald J. 1978. Five-year growth and development in a virgin Arizona mixed conifer stand. USDA Forest Serv. Res. pap. RM-203.22.

Moir, William H. and John A. Ludwig. 1979. A classification of spruce-fir and mixed conifer habitat types of Arizona and New Mexico. USDA Forest Serv. Res. Pap. RM-207, 47 p.

NORTH FORK THOMAS CREEK RNA 500 ac.
Hannagan Meadow NE Quadrangel (USFS 7.5')



SAN FRANCISCO PEAKS RESEARCH NATURAL AREA

Coconino National Forest, Flagstaff District, Arizona

Primary Ecosystem: 121.32 bristlecone pine-limber pine

1309 acres

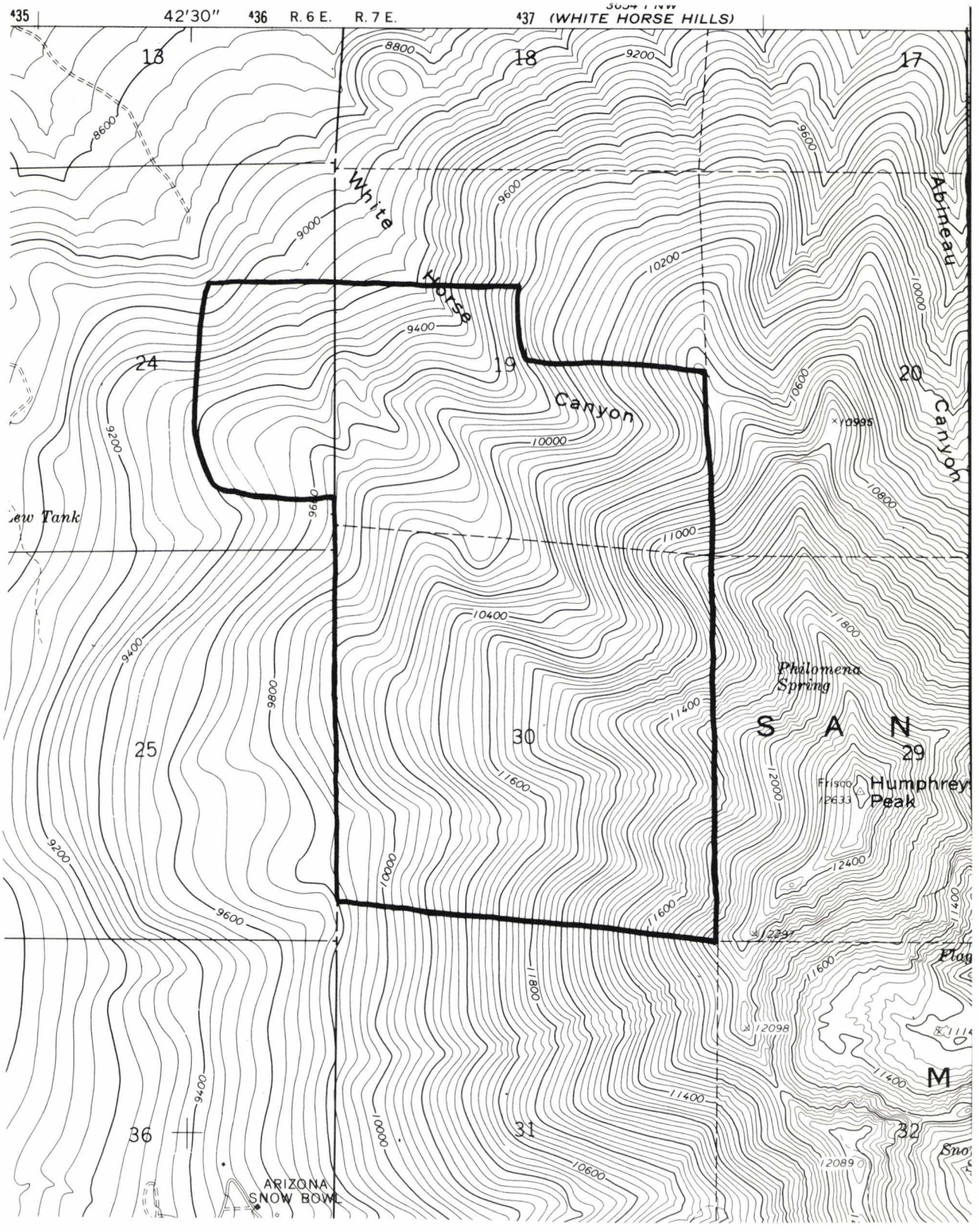
This research natural area was established in 1935. One of the original criteria for selecting this location was to protect and designate for research a representative sample of bristlecone pine (Pinus aristata). The original boundaries, however, included only modest acreage of bristlecone pine, and most of the established area contains spruce-fir forests (Rominger and Paulik 1983). Therefore a boundary extension of about 150 acres (60 ha) will include a good sample of bristlecone pine as originally intended.

On the east boundary of the original area an extension of about 135 acres (55 ha) includes a portion of alpine tundra. Since the entire off-trail tundra in vicinity of Humphrey Peak is restrictively managed to protect the fragile tundra (the only alpine tundra in Arizona), the primary purpose of this extension is to indicate an area for approved research activities.

Reference:

Rominger, James M. and Laurie A Paulik. 1983. A floristic inventory of the plant communities of the San Francisco Peaks Research Natural Area. USDA For. Serv. Gen. Tech. Rep. Rm-96, 9 p.

SAN FRANCISCO PEAKS RNA 1309 ac.
Humphreys Peak Quadrangle (USGS 7.5')



ROCKY GULCH RESEARCH NATURAL AREA

Coconino National Forest, Long Valley District, Arizona

Primary Ecosystem: 122.32 ponderosa pine forest

960 acres (389 ha)

This area is control Watershed No. 13 of the former Beaver Creek Experimental Watershed. Topography between 6800 feet (2070 m) and 7900 feet (2160 m) elevation is mostly within the Pinus ponderosa/Quercus gambelii habitat type on steep slopes and the Pinus ponderosa/Festuca Arizona habitat type, Quercus gambelii phase of Hanks et al., (1983) on moderate and gentle slopes. Adjoining communities occur on wetter sites and are mixed conifer forests. The area has a fire history that needs clarification, but reconnaissance suggests that the last fire was about 80-100 years ago (before 1983). Although there do not seem to be plentiful fire scarred trees in the area, it would be possible to develop a master fire chronology. Some snags have scars that suggest multiple fires (Dieterich 1983).

An advantage of this area for research is the weir in Rocky Gulch and the history of watershed and silvicultural research for the general vicinity. Rocky Gulch RNA and the treatments outside have provided sites for much data concerning bird community dynamics in ponderosa pine forests (Szaro and Balda 1979).

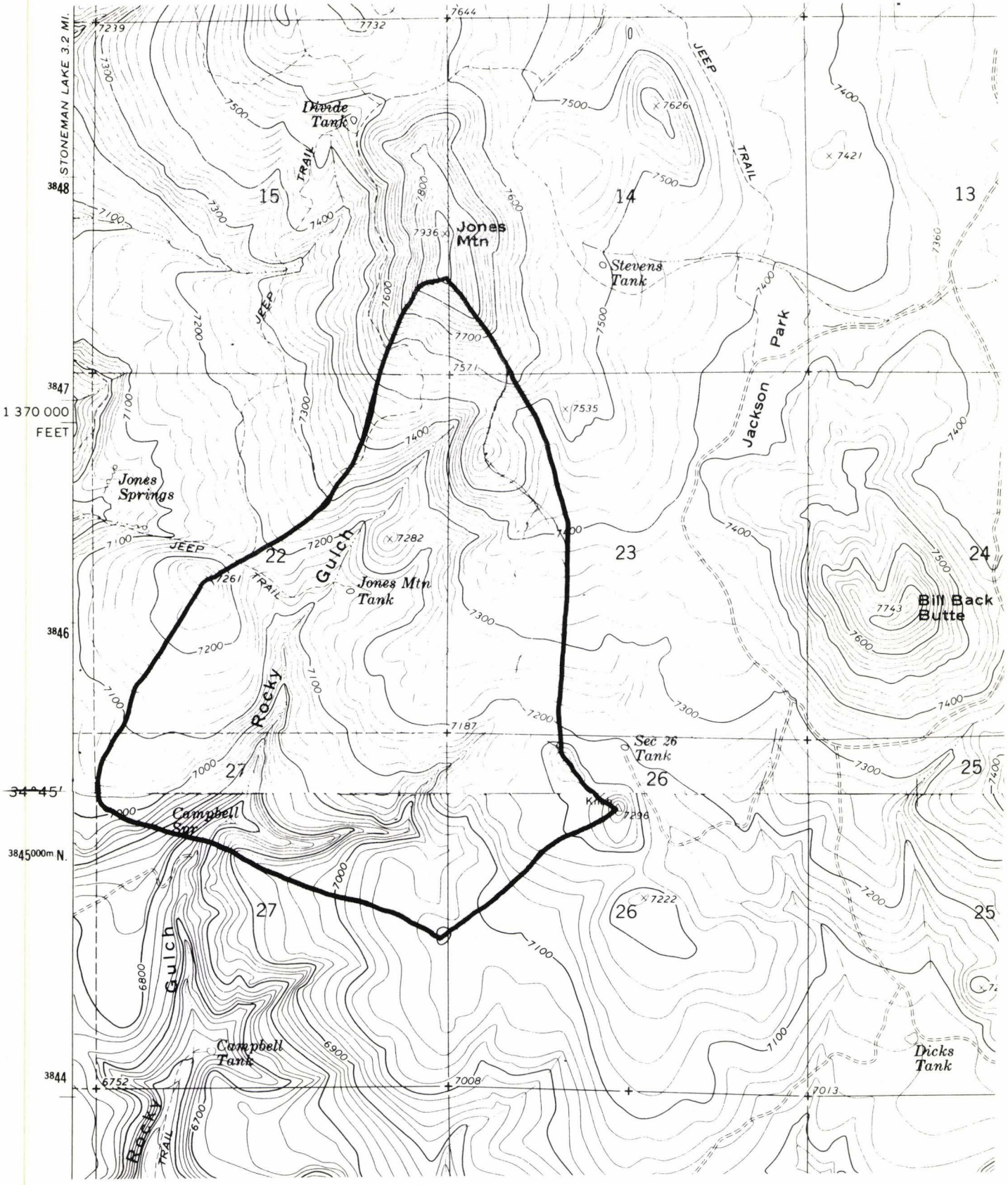
References:

Dieterich, John H. 1983. Letter (4060, September 12, 1983) to Don Renton, Director of Land Management Planning, USDA Forest Serv., Albuquerque, NM 87102, 1 p.

Hanks, Jess P., E. Lee Fitzhugh, and Sharon R. Hanks. 1983. A habitat type classification system for ponderosa pine forests of northern Arizona. USDA Forest Serv. Gen. Tech. Rep. RM-97, 22 p.

Szaro, Robert C. and Russell P. Balda. 1979. Bird community dynamics in a ponderosa pine forest. Cooper Ornith. Soc. Studies in Avian Biol. No. 3, vi, 66 p.

ROCKY GULCH RNA 960 ac.
Hutch Mt. & Happy Jack Quadrangles (USGS 7.5')



SANTA CATALINA RESEARCH NATURAL AREA

Coronado National Forest, Santa Catalina District, Arizona

Primary Ecosystem: 122.32 Arizona pine forest

890 acres (360 ha)

This area was established in 1927 as a research natural area from encouragement of the Tucson Natural History Society. The Society proposed a "natural area" in the Santa Catalina Mountains be set up for a variety of purposes including the stimulation and appreciation of the out-doors, study of wildlife, and conservation of natural resources. The proposal by the Society was adopted by the Forest Service, and the Nation's first Research Natural Area included 4131 acres (1673 ha) established under the Secretary of Agriculture's U-4 Regulation "To keep the area in its present status so far as practicable to the end that the flora may be made the subject of study by the Natural History Society of Tucson; and other like scientific organizations."

The entire area of the original RNA tract is within the Santa Catalina Wilderness, and management of so vast a tract for strictly scientific and educational purposes is no longer so practical in view of the high recreational usage of the area. The adjusted boundary provides a more manageable area while at the same time including ecosystems representative of the larger, original area. Lemmon Canyon contains a stringer of riparian vegetation, and both encinal/rockland and Arizona pine/rockland ecosystems in the adjusted boundary (on uplands and canyon slopes) are vegetations widely distributed on the south slopes of the Santa Catalina Mountains where very shallow soils (of the Entosol Order) occur on geniss and granitic rock (Terrestrial Ecosystem Survey 1982, Whittaker and Niering 1965, Whittaker et al., 1968).

References:

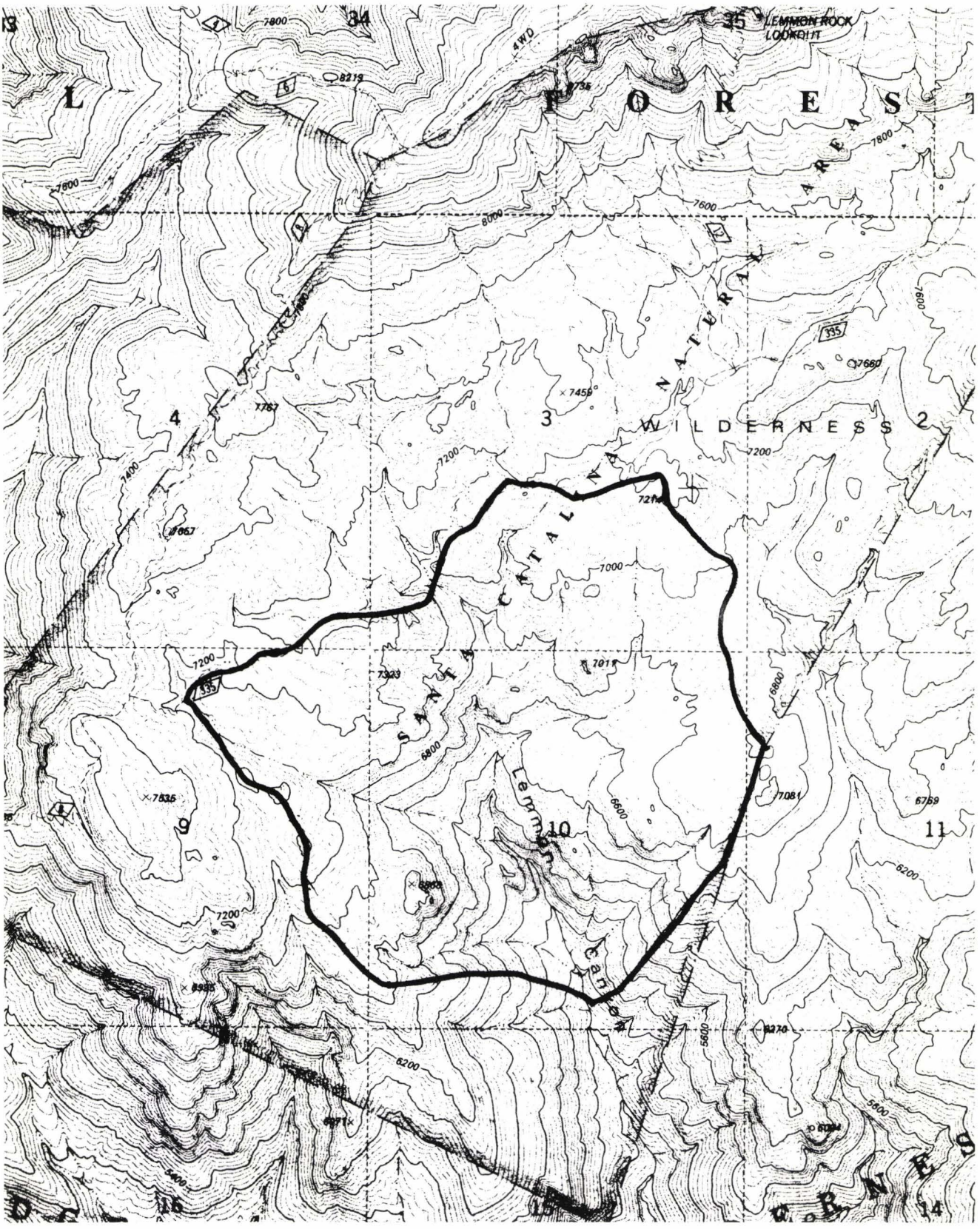
Terrestrial Ecosystem Survey. 1982. Climate-elevation-vegetation gradient, Catalina North and Catalina South, 2 p., USDA Forest Serv., Southwestern Region, Albuquerque, NM 87102.

Smith, E. Linwood. 1974. Established natural areas in Arizona, A guidebook for scientists and educators. Ariz. Off. Economic Planning and Development, Office of the Governor, Phoenix, AZ, 300 p.

Whittaker, R. H. and W. A. Niering. 1965. Vegetation of the Santa Catalina Mountains, Arizona: a gradient analysis of the south slope. Ecology 46: 429-452.

_____, S.W. Buol, W. A. Niering, Y. H. Havens. 1968. A soil and vegetation pattern in the Santa Catalina Mountains, Arizona. Soil Sci. 105: 440-450.

SANTA CATALINA RNA 890 ac.
Mount Lemmon Quadrangle (USGS 7.5)



WILDCAT CANYON RESEARCH NATURAL AREA

Sitgreaves National Forest, Heber District, Arizona

Primary Ecosystem: I22,4I pinyon-juniper woodland

513 acres (208 ha)

This area borders Wildcat Canyon on the south and east (sections 2 and II of R15E, T13N). In the distant past it was part of a sheep allotment under a herded type of management. Included in the RNA are the adjacent slopes, canyon bottom, and sandy terraces of Wildcat Canyon. Elevations within the boundary range from 6400-6700 feet (1950-2040 m).

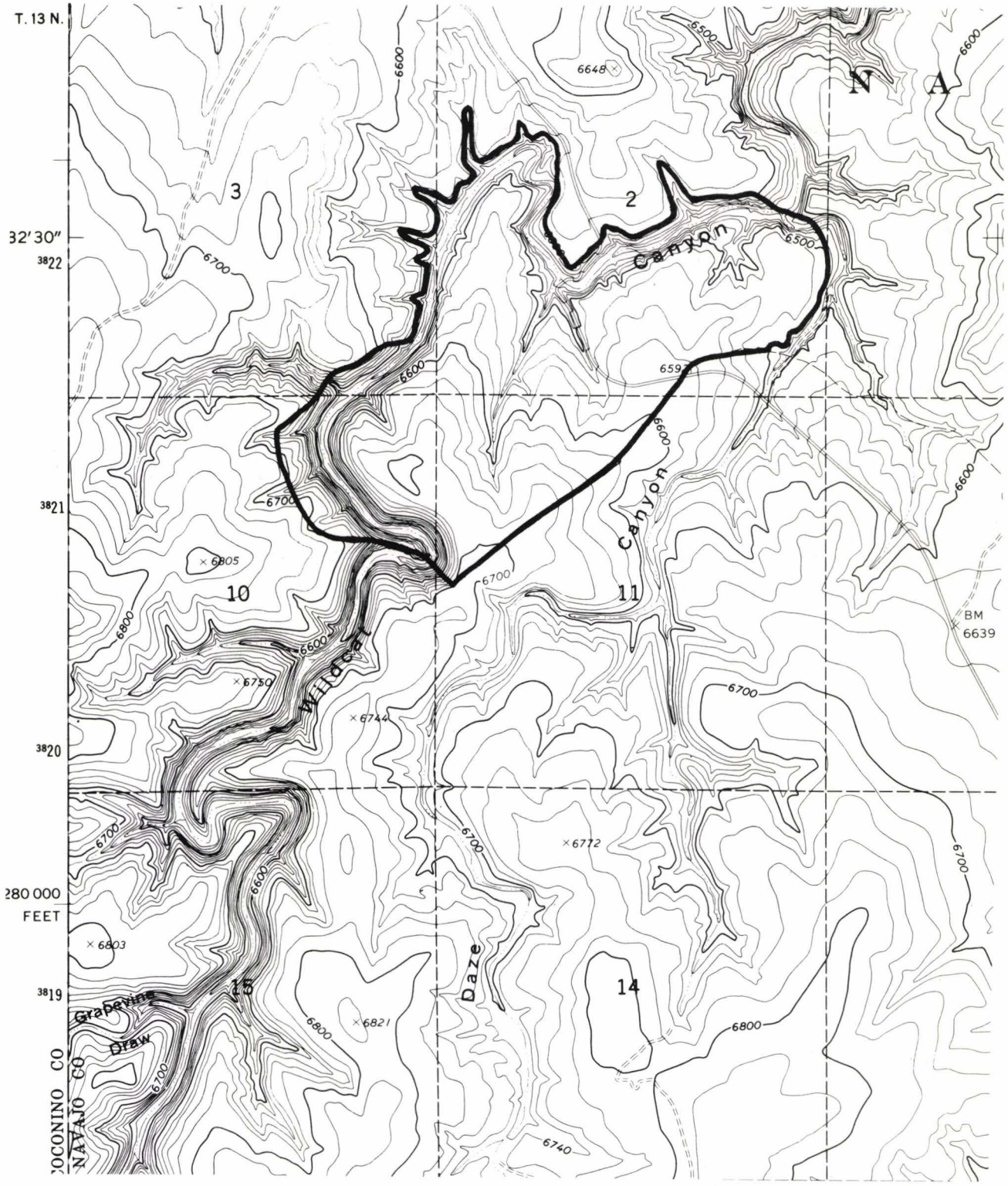
The primary ecosystem occupying the gentle limestone-sandstone caprock is a Pinus edulis-Juniperus osteosperma/Cowania mexicana/Bouteloua gracilis woodland.

The steep north-facing slopes of Wildcat Canyon contain stringers of Pinus ponderosa and a variety of grasses beneath. Along the streamside terraces are populations of such native grasses as Stipa comata, Panicum virgatum, and Sorghastrum nutans. A principal shrub of the active channel of the intermittent drainage is leadplant (Amorpha sp.).

The list of plants in the pinyon-juniper woodland includes Yucca baccata. Cowania mexicana, Opuntia pheaacantha, Gutierrezia sarothrae (infrequent), Bahia dissecta, Polygala alba, Commelina dianthifolia, Artemisia ludoviciana, A. campestris, A. frigida (especially in small openings), Eriogonum cf alatum, Lotus wrightii, Bouteloua gracilis, B. hirsuta, Poa fendleriana (draws and wetter microsites), Oryzopsis micrantha (under trees), Aristida fendleriana, A. arizonica, Carex cf geophila, Lycurus phleoides, Blepharoneuron tricholepis, and Muhlenbergia montana (wetter microsites).

The "old-growth" structure of the woodland is evidenced by many snags and by seedlings and saplings evident in small, sunny microsites.

WILDCAT CANYON RNA 513 ac.
(USFS No. A-211 SW 7.5')



POLE BRIDGE CANYON RESEARCH NATURAL AREA

Coronado National Forest, Douglas District, Arizona

Primary Ecosystem: 123.32 oak-pine forest

565 acres (229 ha)

This area was established in 1931 to include distinctive populations of southern Arizona pines. These pines are Apache pine (Pinus engelmanni), southwestern white pine (P. strobiformis), border pinyon (P. discolor), Arizona pine (Pinus arizonica), and Chihuahua pine (P. leiophylla). Inclusion of all of these pine species in a single location contributes to the uniqueness of this Research Natural Area. General description of the area is provided by Smith (1974, p 43 ff).

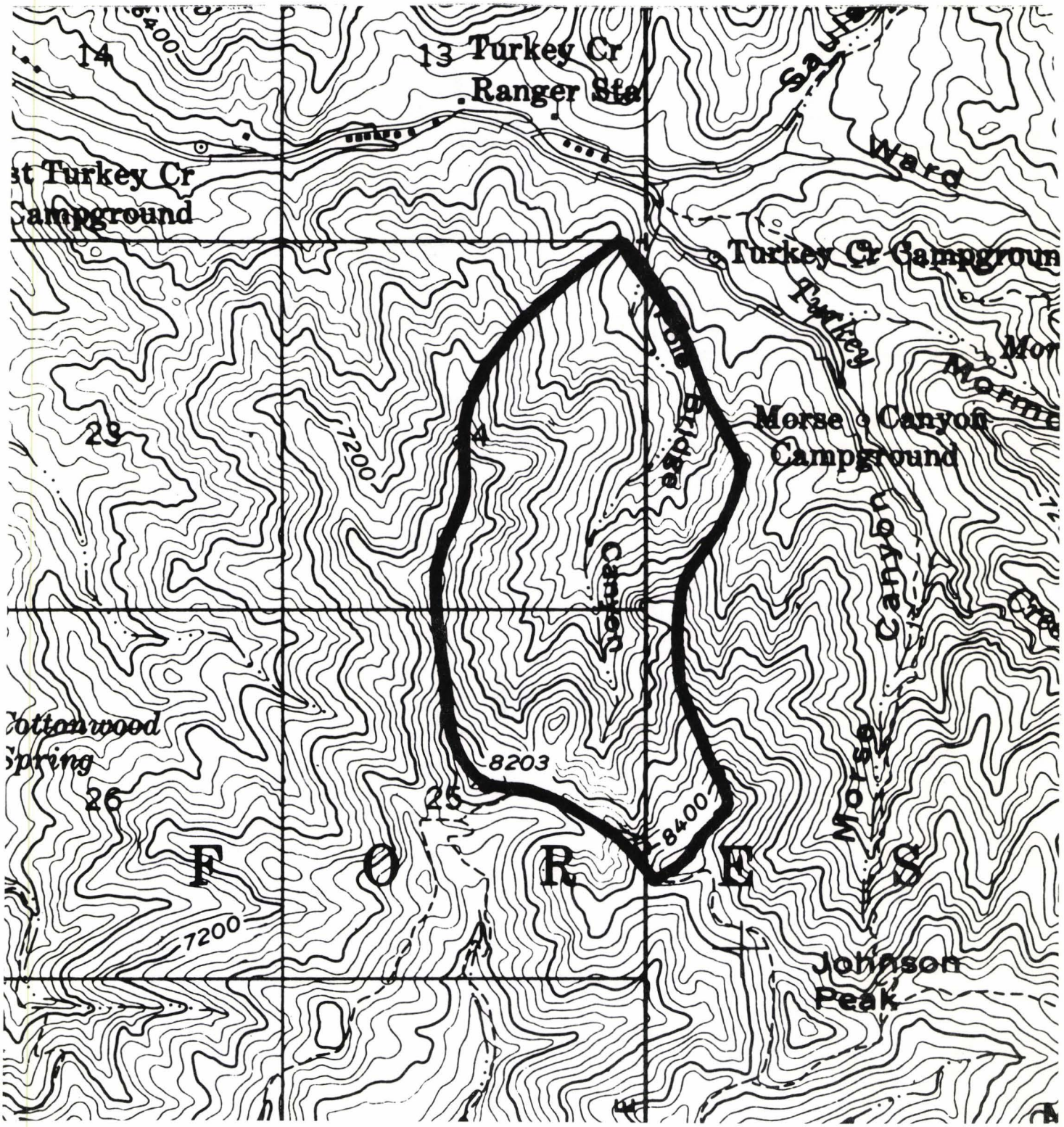
The original boundary included 460 acres (186 ha) but did not contain viable populations of Chihuahua pine. The enlarged boundary encompasses good examples of the Pinus leiophylla/Quercus arizonica and Pinus leiophylla/Quercus hypoleucoides habitat types (DeVelice and Ludwig 1983). The additional 105 acres (43 ha) includes a small natural drainage on the northwest boundary of the original area, and has excellent stands of Chihuahua pine. Associated plants include Arizona white oak and silverleaf oak (Quercus arizonica, Q hypoleucoides), border pinyon, alligator juniper (Juniperus deppeana), Schotts yucca (Yucca schottii), bullgrass (Muhlenbergia longiligula) three-awn (Aristida orcuttiana), Texas bludstem (Andropogon cirratus), pinyon ricegrass (Piptochaetium fimbriatum), and bedstraw (Galium asperrimum).

References:

DeVelice, Robert L. and John A. Ludwig. 1983. Forest habitat types south of the Mogollon Rim, Arizona and New Mexico. Final Rep. Coop. Agreement 28-K2-240, Rocky Mountain Forest and Range Exp. Sta., Flagstaff, AZ 86001.

Smith, E. Linwood. 1974. Established natural areas in Arizona, A guidebook for scientists and educators. Ariz. Off. Economic Planning and Development, Office of the Governor, Phoenix, AZ, 300 p.

POLE BRIDGE CANYON RNA 565 ac.
Chiricahua Peak Quadrangle (USGS 15')



BUCKHORN MOUNTAIN RESEARCH NATURAL AREA

Tonto National Forest, Roosevelt District, Arizona

Primary Ecosystem: 133.31 scrub oak chaparral

2700 acres (1090 ha)

Steep slopes of Buckhorn Mountain in the Four Peaks vicinity are extensively mantled by dense chaparral. A variety of chaparral associations exist within the rugged topography of the northeast trending drainages. The associations mostly dominated by scrub oak (Quercus turbinella) and other evergreen broadleaf sclerophyll shrubs have been described by Carmichael et al. (1978).

Within the RNA are two chaparral watersheds (Baldy Canyon and Upper Buckhorn Creek). In the event of fire it is unlikely that both watersheds would be equally burned, and thus researchers would have opportunity to study fire succession and physiology of various chaparral species in both watersheds.

The area is accessible via Granite Springs and Baldy Canyon trails.

References:

Bolander, Donald H. 1982. Chaparral in Arizona. P. 60-63 IN: C. E. Conrad and W. C. Oechel (Tech. Coors.) Dynamics and management of Mediterranean-type ecosystems. USDA Forest Serv. Gen. Tech. Rep. PSW-58, 637 p.

Carmichael, R. S., O. D. Knipe, C. P. Pase, and W. W. Brady. 1978. Arizona chaparral: plant associations and ecology. USDA Forest Serv. Res. Pap. RM-202, 16 p.

Knipe, O. D., C. P. Pase, and R. S. Carmichael. 1979. Plants of the Arizona chaparral: USDA Forest Serv. Gen Tech. Rep. RM-64, 54 p.

BUCKHORN MOUNTAIN RNA 2700 ac.
Four Peaks Quadrangle (USGS 7.5)

SYCAMORE CANYON RESEARCH NATURAL AREA

Coronado National Forest, Nogales District, Arizona

Primary Ecosystem: 134.31 Sinaloan thornscrub

1470 acres (595 ha)

This area, contiguous with the Goodding Research Natural Area, includes the remainder of Sycamore Canyon to the border of Mexico at about 3400 feet (1040 m) elevation. Numerous plants in this portion of the canyon are found nowhere else in the United States. The extension to the Mexican border essentially fulfills the argument of Arizona Botanist, Leslie Goodding, in 1961 that the area merits special managment as a natural area because of its botanical diversity. A recent inventory (Toolin et al., 1979) documented a vascular plant flora of 624 species, 349 genera, and 96 families.

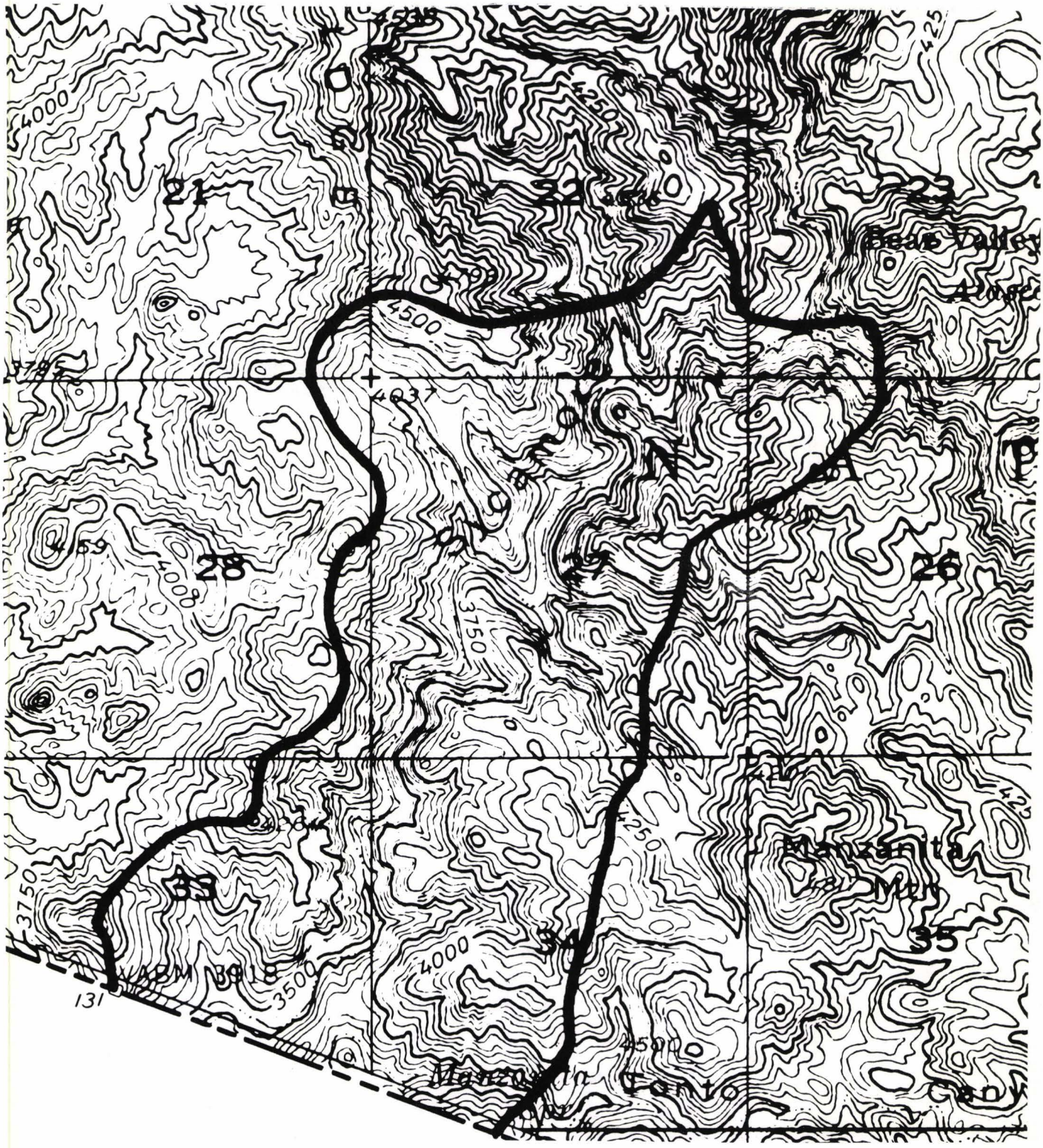
The Arizona Natural Heritage program considers the southern portion of Sycamore Canyon sufficiently unique ecologically to warrant its classification as Sinaloan thornscrub.

References:

Goodding, Leslie N. 1961. Why Sycamore Canyon in Santa Cruz County should be preserved as a natural sanctuary or natural area. J. Ariz. Acad. Sci. 1: 113-115.

Toolin, Laurence J., Thomas R. Van Devender, and Jack M. Kaiser. 1979. The flora of Sycamore Canyon, Pajarito Mountains, Santa Cruz County, Arizona. J. Ariz.-Nev. Acad. Sci. 14: 66-74.

SYCAMORE CANYON RNA 1470 ac.
Ruby Quadrangle (USGS 15')



GARLAND PRAIRIE RESEARCH NATURAL AREA

Kaibab National Forest, Chalender District, Arizona

Primary Ecosystem: 141.41 Rocky Mountain montane grassland

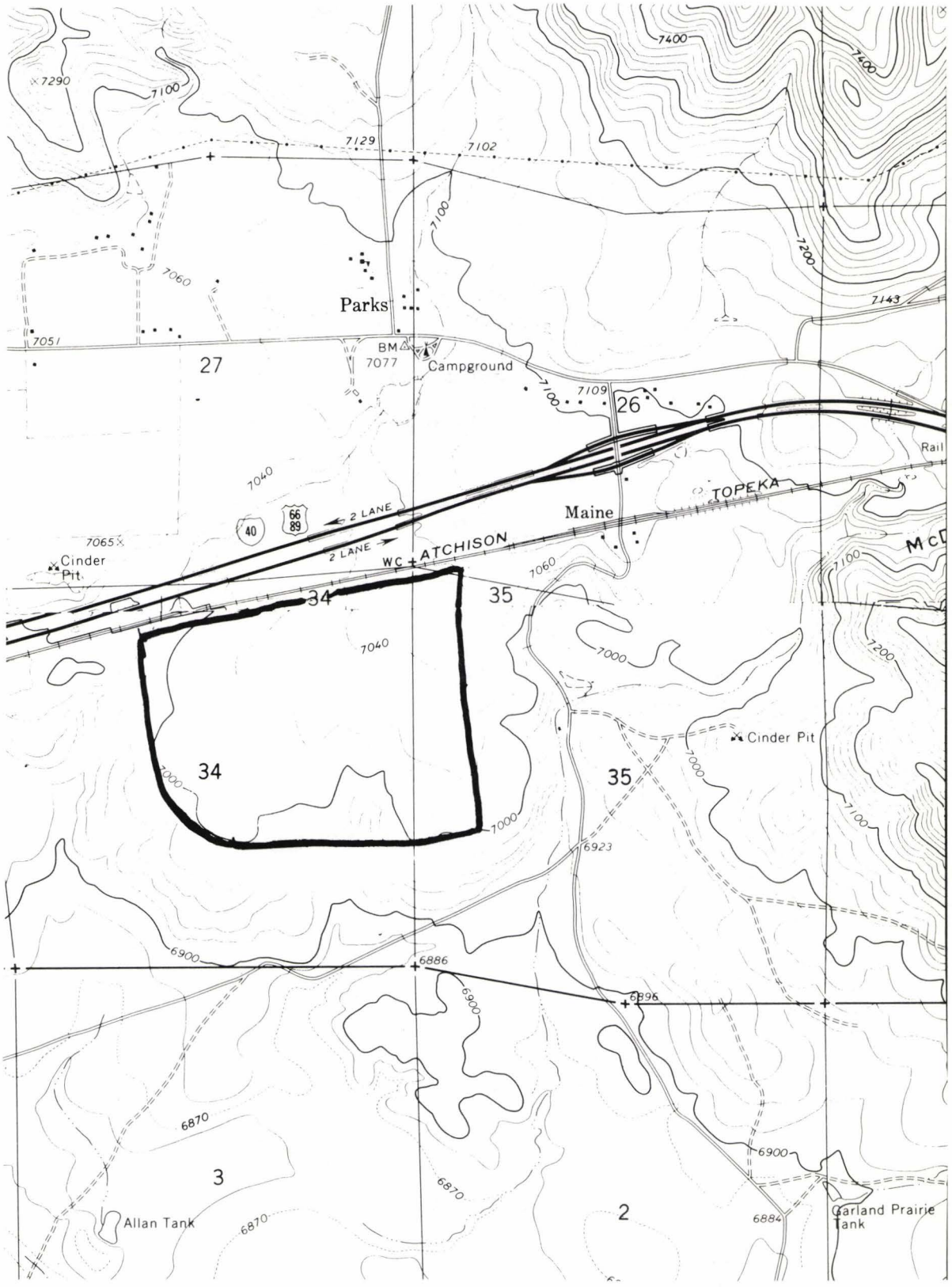
300 acres (122 ha)

This nearly level area at around 7020 feet (2140 m) elevation contains Arizona fescue grassland in nearly climax condition. The montane grassland is bordered by a very open ponderosa pine savanna. Occasional young Pinus ponderosa occur within the prairie.

Dominant grasses are Festuca arizonica and Muhlenbergia montana. Other grasses include Poa fendleriana, Sporobolus interruptus, Sitanion hystrix, and Bouteloua gracilis. Forbs are relatively minor. Species include Circium cf wheeleri, Antennaria sp., Arenaria fendleri, and Eriogonum racemosum.

Soils are derived from basalt with an average profile depth of around 20 inches (50 cm). The argillic horizon is high in montmorillonite clay. The profiles are described as Typic and Lithic Argiborolls (Terrestrial Ecosystem Survey mapping unit 518).

GARLAND PRAIRIE RNA 300 ac.
Garland Prairie Quadrangle (USGS 7.5')



ESCUDILLA MOUNTAIN RESEARCH NATURAL AREA

Apache National Forest, Alpine District, Arizona

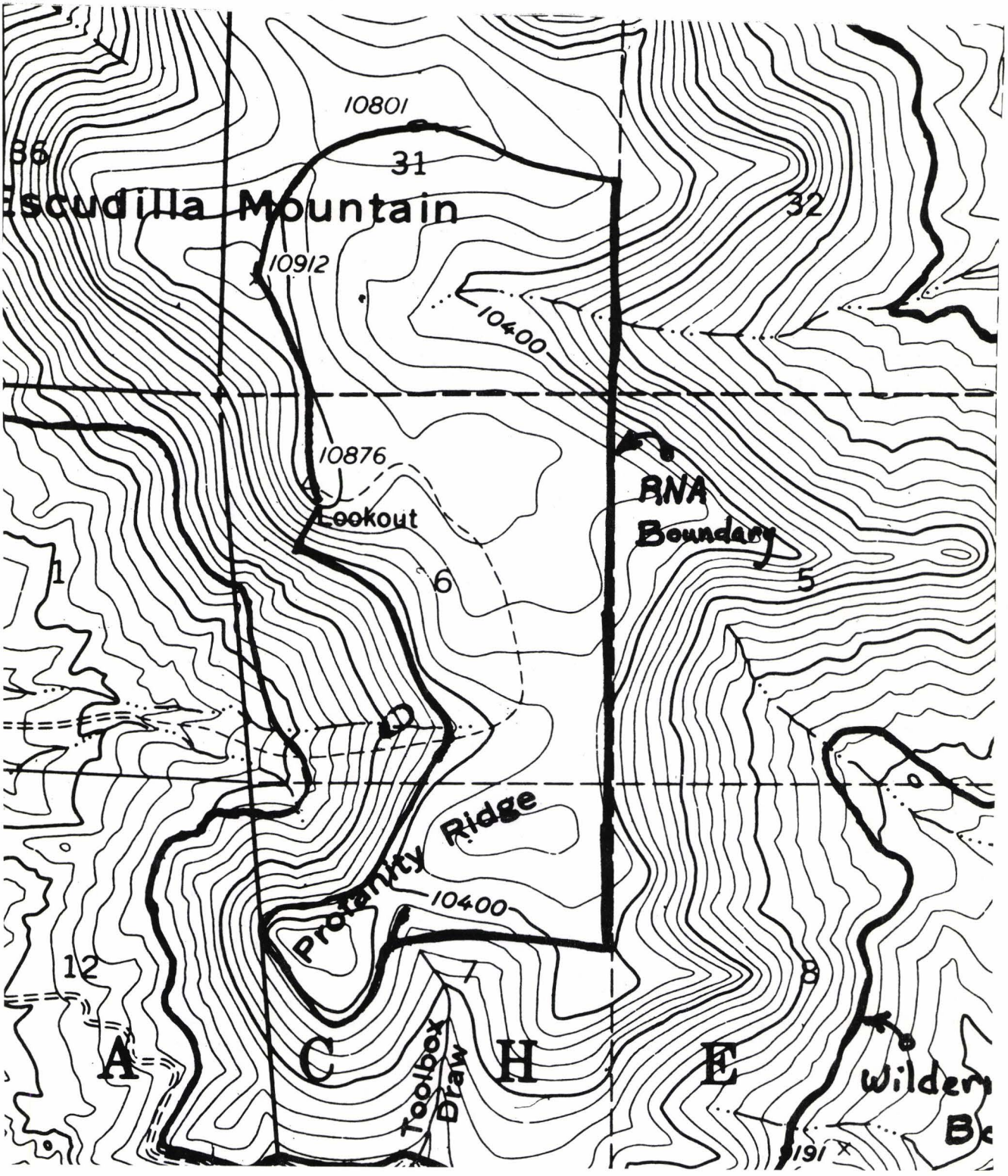
Primary Ecosystem: 141.41 Rocky Mountain montane grassland

909 acres (368 ha)

Escudilla Mountain has a relatively undeveloped and inaccessible knob rising to about 10,800 feet (3290 m) elevation. An approximately 4000 acre (1620 ha) unit was allocated to preservation management in the Escudilla Demonstration Area management plan adopted by the Forest in 1978. Within this unit, which is mostly fenced, are three montane grasslands surrounded by forest. Because of inaccessibility and distance from water these have received very light use by livestock over past years.

In the aggregate these meadows comprise perhaps 500 acres (200 ha). The southerly slopes of Profanity Ridge contain an Arizona fescue and mountain muhly (Festuca arizonica-Muhlenbergia montana) meadow. The middle meadow contains appreciable tufted hairgrass (Deschampsia caespitosa) in slight depressions. The third meadow north of the Lookout is dominated by Thurber fescue (Festuca thurberi) which to our knowledge is the only such community in Arizona of a type widespread in New Mexico and Colorado. Each of these meadows exists in good or even excellent range condition.

ESCUDILLA MOUNTAIN RNA 909 ac.
Alpine NE, Ariz.-N. Mex. (USFS 7.5')



HAUFER WASH RESEARCH NATURAL AREA

Tonto National Forest, Tonto Basin District, Arizona

Primary Ecosystem: 143.12 grama-tobosa grassland

600 acres (243 ha)

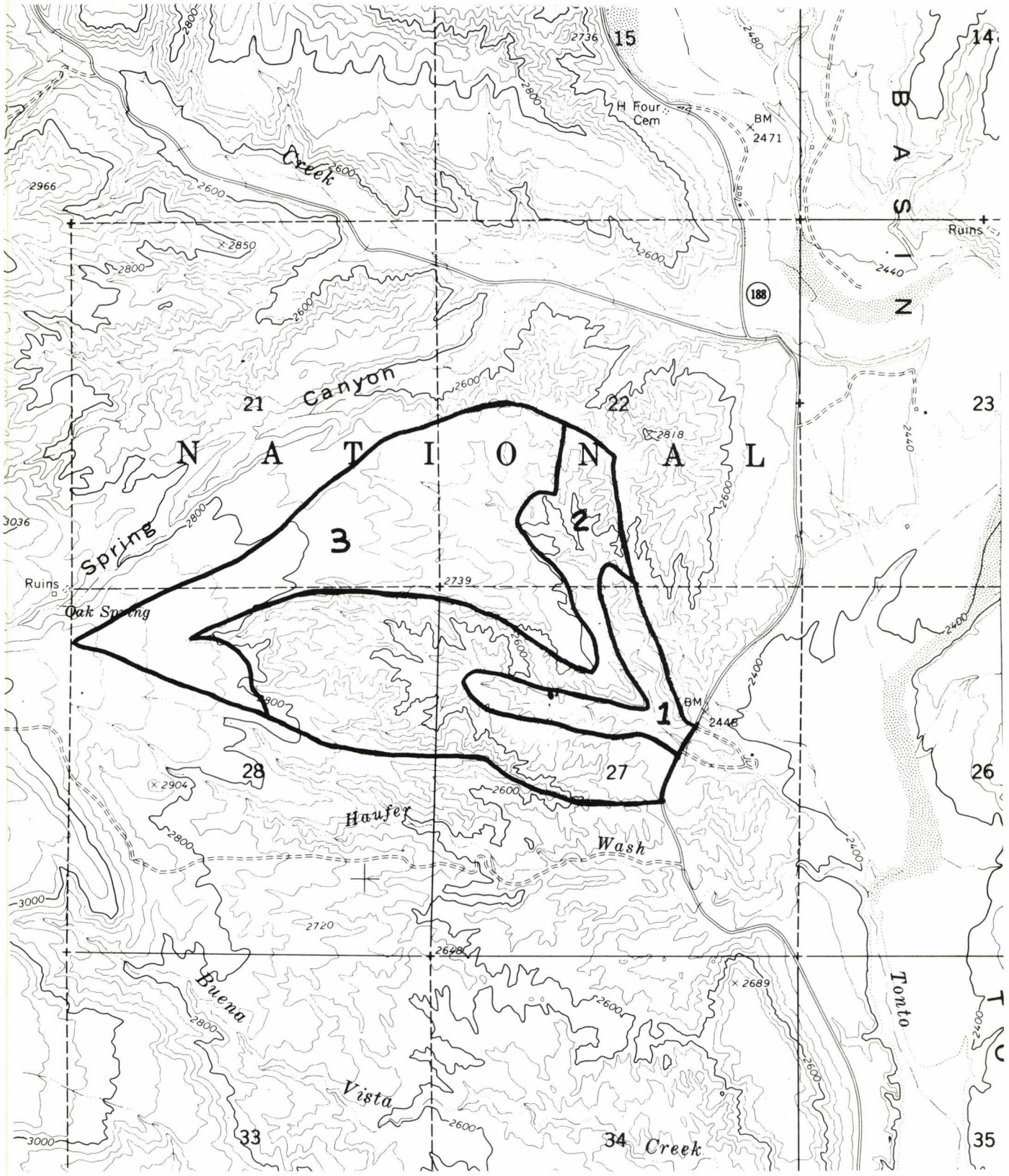
Haufer Wash recommended RNA contains ecosystems described as semidesert grass-shrub in central Arizona (Martin 1975, Paulsen and Ares 1962). Prior to its establishment in the early 1930's as a range exclusion, it was evidently utilized severely by sheep and cattle. Today the area has special research and management interest because it contains vegetation after over 50 years of recovery following livestock exclusion. Because the soil, landform, climate, and vegetation potential represent thousands of acres of ongoing livestock management on the Tonto Allotment, as well as adjacent allotments within the semidesert grass-shrub ranges of the Tonto Basin and Roosevelt Lake Districts, Haufer Wash provides an outstanding perspective for managers and research. It was proposed by the Tonto National Forest as a RNA in 1972 (see Establishment Report March 8, 1972). The Regional RNA Task Force again endorses its RNA establishment after over a half century of livestock exclusion.

The cover type descriptions in the 1972 report are somewhat inaccurate. For example, creosote bush is not a "major species." The following, from reconnaissance in July 1982, are brief vegetation descriptions. See map for areas and boundaries.

1. Wash. This small, intermittent drainage (just north of Haufer Wash) does not contain enough water discharge to support a strongly distinctive riparian vegetation. Major shrubs are catclaw and whitehorn acacias (Acacia greggii, A Constricta), burrobush (Hymenoclea sp), and desert broom (Baccharis sarothroides). Occasional shrubs include desert willow (Chilopsis linearis), hackberry (Celtis reticulata), Juniper (likely Juniperus erythrocarpa), scunkbush (Rhus trilobata), algerita (Berberis haematocarpa), and Condalia. Common cacti are pricly pears (Opuntia engelmannii) and chollas (Opuntia acanthocarpa, O. leptocaulis). A few turbinella oak (Quercus turbinella), cliffrose (Cowania mexicana) and creosotebush (Larrea divaricata) occur.

2. Dissected Alluvial Breaks. Most of the area consists of deep old valley-fill alluvium. Where this has been dissected by Holocene stream action, a variety of steep toeslopes adjoin the wash. On the south-facing alluvial toeslopes are extensions of Sonoran desert. Conspicuous plants include jojoba (Simmondsia chinensis), saguaro (Cereus giganteus), brittle bush (Encelia farinosa), ocotillo (Fouqueria splendens), and false mesquite (Calliandra eriophora). These slopes are very grassy. Frequently encountered grasses include three awns (Aristida spp), bush muhly (Muhlendergia porteri), and slim tridens (Tridens muticus). A small, fish-hook cactus (Mammalaria sp) is common.

HAUFER WASH RNA 600 ac.
Kayler Butte Quadrangle (USGS 7.5)



The north facing toeslopes contrast. Here crucifixion thorn (Canotia holacantha) prevails, along with jojoba, bush buckwheat (Eriogonum fasciculatum), false mesquite, shrubby bedstraw (Galium stellatum), juniper (Juniperus erythrocarpa), and menodora (Mendora scabra). These sites examined were quite grassy. Needle-and-thread (Stipa speciosa) and side-oat grama (Bouteloua curtipendula) were common. These aspects are too cold in winter for saguaro, but such other "Sonoran" species as buckhorn cholla (Opuntia acanthocarpa and the highly palatable herb, Porophyllum gracilis, could be found.

3. Mesa tops. The west portions of the RNA above oak spring canyon are gently sloping alluvial (bajada) surfaces. Historically, this terrain was grazed hard. Today such grassland increasors as mesquite (Prosopis juliflora), engelmann prickly pear, turpentine bush (Haplopappus laricifolius), and snakeweed (Gutierrezia sp.) still dominate. The most common perennial grass is a species of three-awn. However, patches of curly mesquite (Hilaria belangeri) are found on the fine-textured, montmorillonitic clay soils. Other plants of the mesa tops include false mesquite, buckwheat (Eriogonum wrightii), ratany (Krameria parviflora), algerita, globemallow (Sphaeralcea sp.), hedgehog cactus (Echinocereus fendleri), and catlaw acacia. Red berried junipers are widely scattered (canopy cover from trace to about one percent). Along gentle drainages one found occasional blue paloverde (Cercidium floridum).

PICKET POST MOUNTAIN RESEARCH NATURAL AREA

Tonto National Forest, Globe District, Arizona

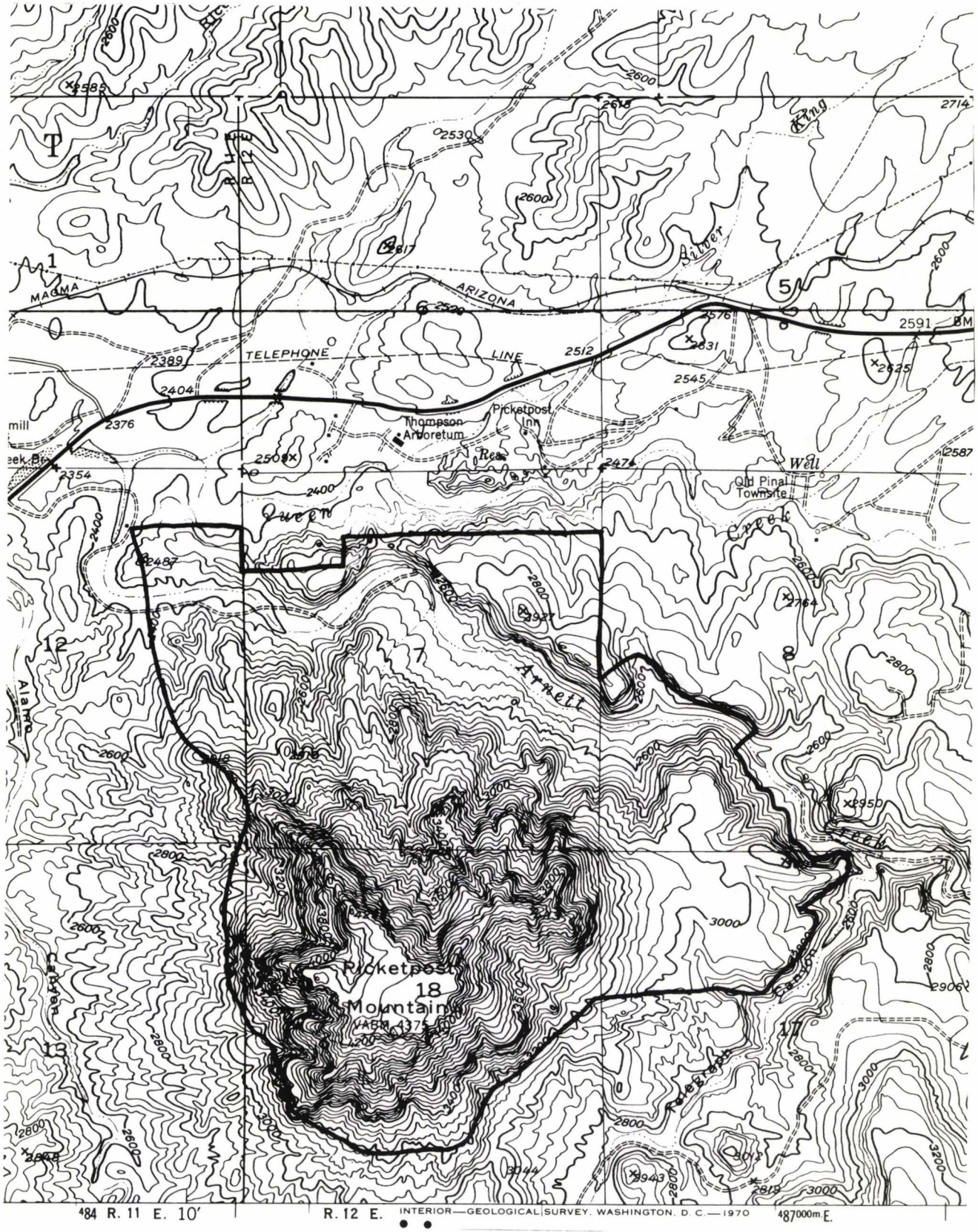
Primary Ecosystem: 154.12 Paloverde-Mixed cacti desert

1200 acres (486 ha)

The vicinity around Picket Post Mountain contains fine examples of Sonoran desert in many of its varied plant community associations on foothills and piedmont topography. The eastern piedmont, bounded by cliffs along Telegraph Canyon and Arnett Creek, represents the Sonoran desert on gentle upland slopes typical of grazing lands (e.g. the Superior Allotment) in this area. Along Arnette Creek is a good stretch of broadleaf cottonwood forest along permanently flowing waters (223.21 cottonwood-willow). Some of the examples of desert vegetation are near the limiting cold temperature boundary for saguaro cactus.

The Boyce Thompson Arboretum has managed much of the area under a special use permit for many years. Thus, many of the ecosystems exist under conditions that are reasonably undisturbed by man or his livestock and mining activities.

PICKET POST MOUNTAIN RNA 1200 ac.
Picket Post Mtn. Quadrangle (USGS 7.5')



HAYGROUND CREEK RESEARCH NATURAL AREA

Apache National Forest, Springerville District, Arizona

Primary Ecosystem: 222.31 blue spruce forest

316 acres (128 ha)

Hayground creek is a permanent stream flowing into the West Fork Black River and entrenched about 100 feet (30 m) within basalt flows of the region. About 1 mile (1.6 Km) of streamside is included within the boundary.

The primary ecosystem is a blue spruce streamside forest. This forest is the Picea pungens/Poa pratensis habitat type described by Moir and Ludwig (1979), which is extremely uncommon to find in the Southwest in anything approaching minimally disturbed condition. In this RNA, however, the blue spruce stands are in excellent condition as demonstrated by the richness and coverage of streamside herbs and shrubs. For example, one of the botanical features is the high density of Allium gooddingii.

In addition to the streamside forest, the steep north-facing slopes adjoining the stream contain stands of Engelman spruce (Picea engelmanni) with understory of forest fleabane (Erigeron eximius) and many other herbs and shrubs. The drier, warmer slopes on the other side of the canyon contain a variation (Muhlenbergia virescens phase) of the Picea pungens/Festuca arizonica habitat type on cobbly talus slopes.

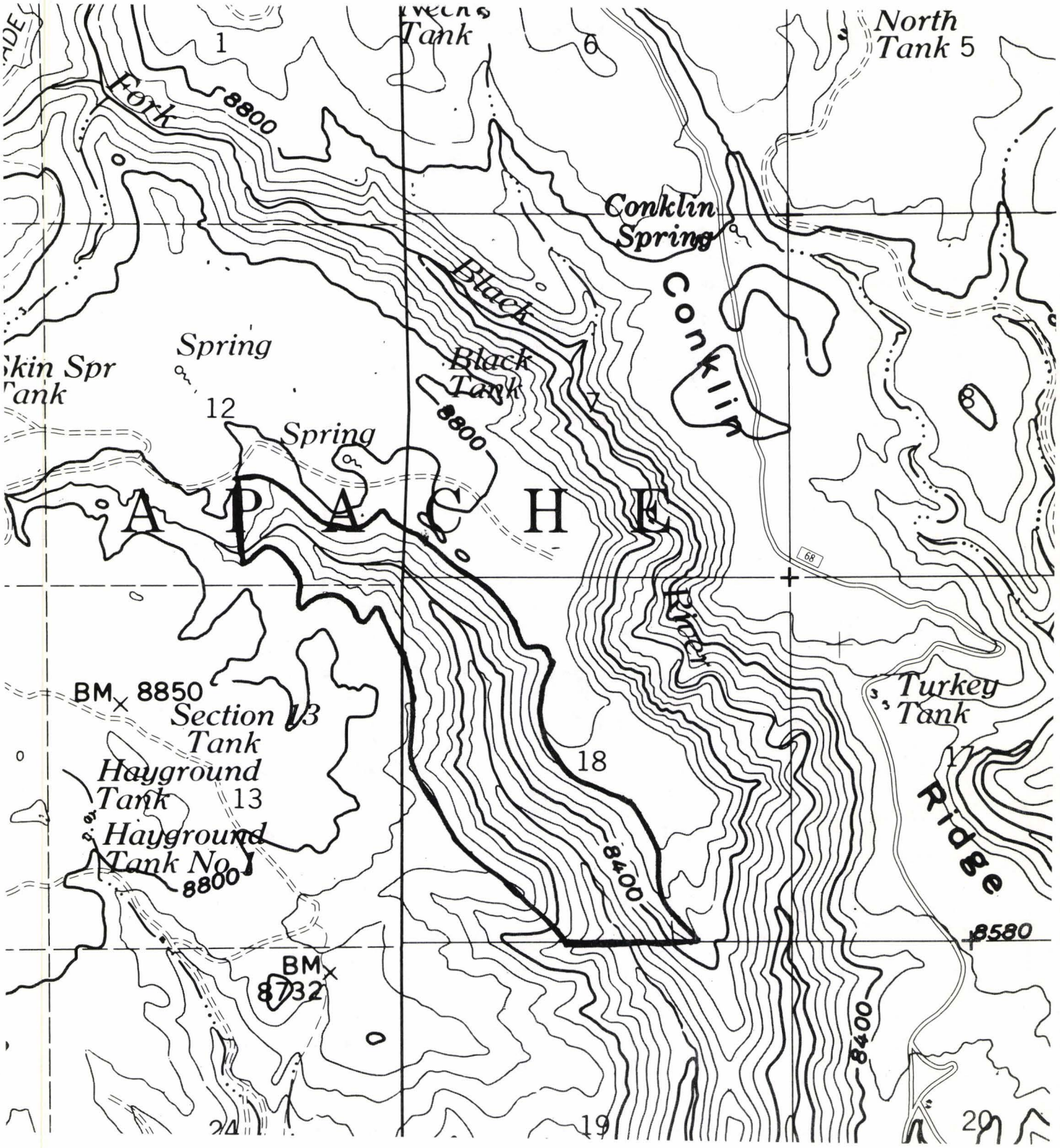
The surrounding uplands that adjoin but are outside the RNA have forests more typical of the Picea pungens/Festuca arizonica habitat type.

A major significance of this Research Natural Area are the populations of blue spruce in a variety of environments. This tree species has recently been identified as a gap in the national representation of ecotypes and ecosystems.

Reference:

Moir, W. H. and J. A. Ludwig. 1979. A classification of spruce-fir and mixed conifer habitat types of Arizona and New Mexico. USDA Forest Serv. Res. pap. RM-207, 47 p.

HAYGROUND CREEK RNA 316 ac.
Big Lake SW Quadrangle (USGS No. A 280SW 7.5')



UPPER FORKS PARKER CREEK RESEARCH NATURAL AREA

Tonto National Forest, Pleasant Valley District, Arizona

Primary Ecosystem: 222.32 and 223.22 mixed broadleaf riparian forest

950 acres (385 ha)

This area is a portion of the former Sierra Ancha Experimental Forest originally withdrawn for research purposes May 18, 1932. The critical ecosystems are canyon bottom forests along both forks of the Parker Creek control watershed.

The lower stretches of the intermittent, 3rd order streamside contain sycamore-walnut forest. The most common trees are sycamores, Arizona walnut, Arizona alder, large specimens of Arizona white oak, and chokecherry (for scientific names see Pase and Johnson 1968). Conifers are Douglas-fir, ponderosa pine, and occasional white fir. Some of the understory shrubs and herbs are wild grape, Virginia creeper, poison ivy, California and hollyleaf buckthorns, skunkbush sumac, smooth sumac, box elder, rose, wild rasberry, bracken fern, purple geranium, blue wildrye, and numerous other grasses and sedges.

At higher elevations (above about 6200 feet) the canyon bottom forest becomes dominated by white fir and big-toothed maple). This is the Abies concolor/ -Acer grandidentatum habitat type described by Moir and Ludwig (1979) and relatively widespread in mountains of southern Arizona and New Mexico. The Task Force feels that such stretch of more or less representative forest is a needed and welcome addition to the ecosystems within the RNA network. Associated trees are white fir, Douglas-fir, ponderosa pine, and occasional Arizona walnut. There are large specimens of canyon live oak up to about 6400 feet, and gambel oak continues at higher, cooler elevations. Big-toothed maple is common along much of upper South Fork. Common understory herbs or low shrubs include mountain-lover (Pachistima myrsinites), snowberry, lead-plant (Amorpha fruticosa), yellow columbine, canada violet, sweet cicely, meadow rue, valerian (Valeriana arizonica), false Solomon's seal (Smilacina racemosa), and many other boreal and Rocky Mountain Cordilleran species (cf. Whittaker and Niering 1964).

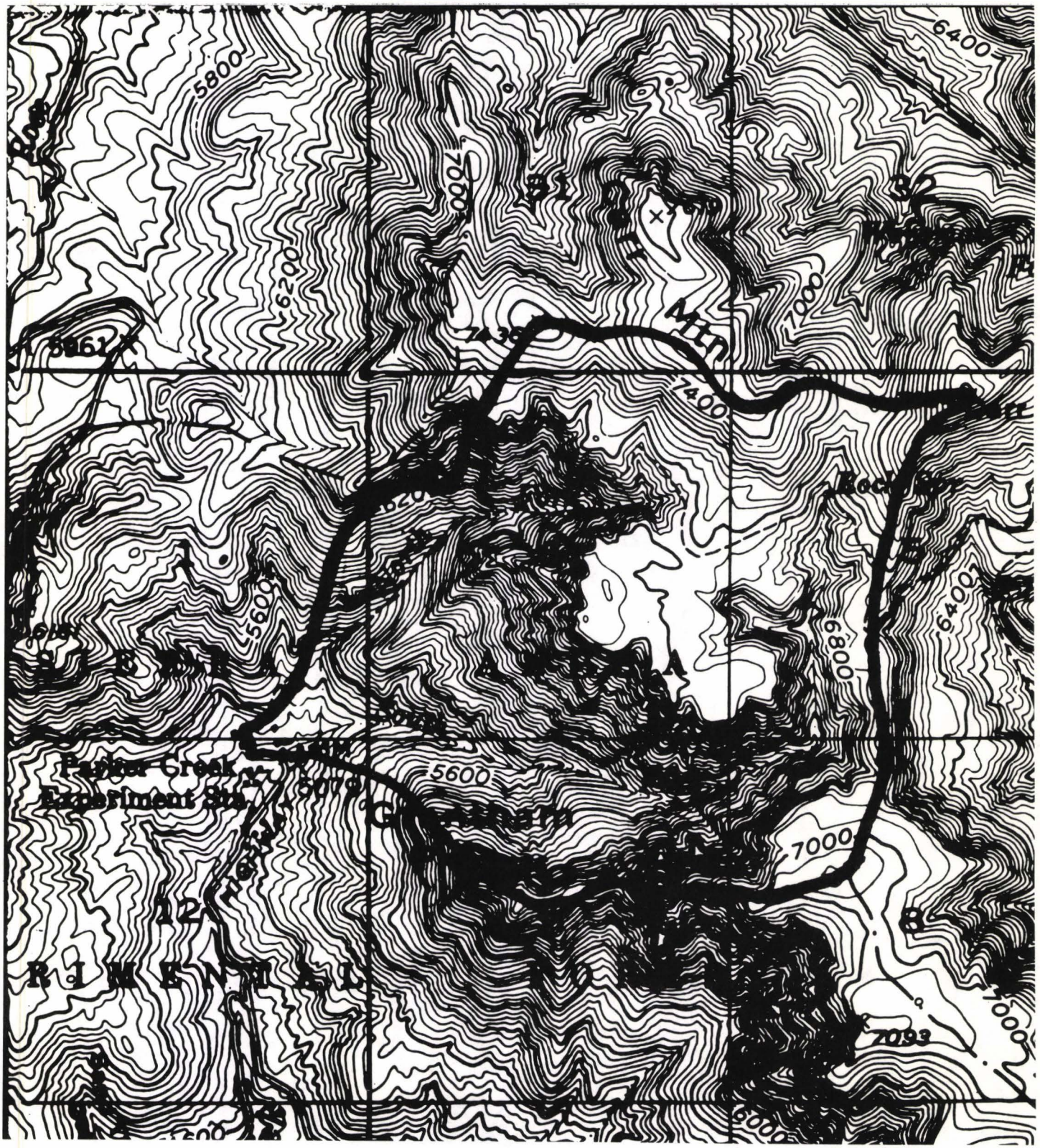
References:

Pase, C. P. and R. R. Johnson. 1968. Flora and Vegetation of the Sierra Ancha Experimental Forest, Arizona. USDA For. Serv. Res. Pap. RM-41, 20 p.

Moir, W. H. and J. A. Ludwig. 1979. A Classification of Spruce-fir and Mixed Conifer Habitat Types of Arizona and New Mexico. USDA For. Serv. Res. Pap. RM-207, 47 p.

Tonto National Forest. 1938. Parker Creek (Sierra Ancha) Experimental Forest. File 4060, 13 page report.

PARKER CREEK RNA 950 ac.
McFadden Peak Quadrangle (USGS 15')



Whittaker, R. H. and W. A. Niering. 1964. Vegetation of the Santa Catalina Mountains, Arizona. Ecological Classification and Distribution of Species. J. Ariz. Acad. Sci. 3:9-34.

WEST CLEAR CREEK RESEARCH NATURAL AREA

Coconino National Forest, Beaver Creek District, Arizona

Primary Ecosystem: 223.22 mixed broadleaf riparian forest

ca 700 acres (284 ha)

West Clear Creek is a 3rd or 4th order stream having about a 6 percent gradient in the proposed area. It is in a relatively wide valley deeply incised within basalt (above) and sandstone (below) formations. The valley and channel geomorphology along the riparian stretch is diverse. There are scour and overflow channels within the active transport zone and a variety of bars, terraces, and intracanyon alluvial fans that adjoin the active zone of the river. The river and its numerous riffles, pools, backwater eddies, and other microhabitats offers diverse environments for fish, mammals, and invertebrates. The most common fish is the roundtail chub, a state listed species. The razor back sucker was also planted into the stream in 1982. River otters have also been seen in the area.

Arizona sycamore (Platanus wrightii) dominates along scour channels of the active transport zone. Alder (Alnus oblongifolia) forms thickets of reproduction here and there along some of the river sandbar margins. Velvet ash (Fraxinus pennsylvanica var velutina) is also occasional, and Fremont cottonwood (Populus fremontii) is uncommon. On higher, drier terraces netleaf hackberry (Celtis reticulata) may occur in groves, and occasional gray oak (Quercus grisea or Q. arizonica), shrub live oak (Q. turbinella), and buckthorn (Rhamnus californica) are found.

Red-berry and Utah junipers (Juniperus erythrocarpa, J. osteosperma) form open savannas on alluvial fans and rocky side slopes. Here grasses and mesquite (Prosopis juliflora) are common.

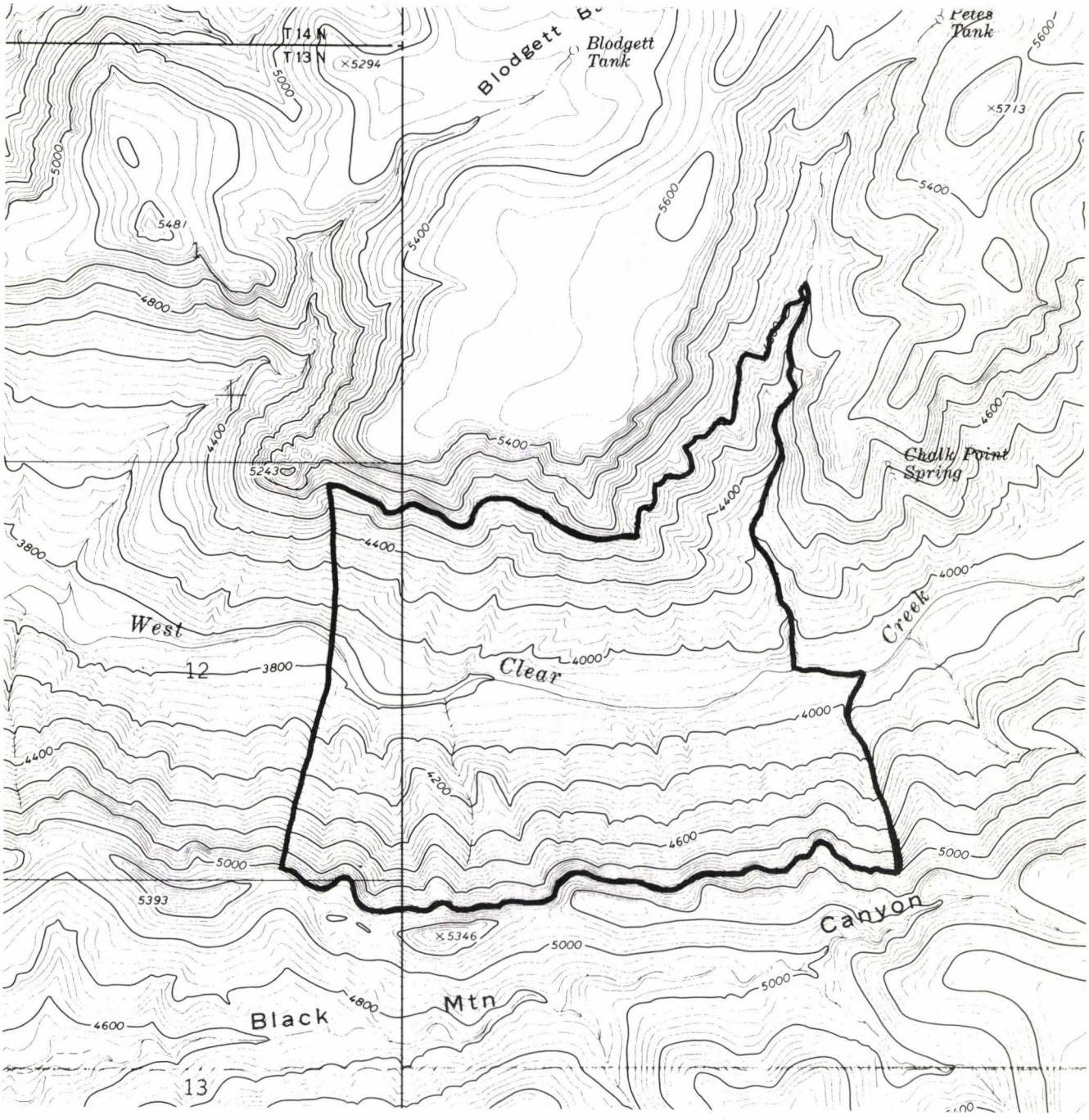
A study of the water quality of West Clear Creek was reported in 1976 (Sommerfeld et al.) and a general description of the sycamore forest appears in the paper by Laurenzi et al. (1983).

References:

Laurenzi, Andrew W., Robert D. Ohmart, and Valerie C. Hink. 1983. Classification of mixed broadleaf riparian forest in Tonto National Forest. Pp 72-81 IN: W.H. Moir and Leonard Hendzel (Tech. Coors.) Proceedings of the workshop on southwestern Habitat types, Albuquerque, New Mexico, April 6-8, 1983. USDA For. Serv., Southwestern Region, 110 p., Albuquerque, NM 87102.

Sommerfeld, Milton R., Robert R. Garmon, Janice F. Parrot, and Mark T. Story. 1976. Investigation of water quality and the associated biota of West Clear Creek. Report to Coconino National Forest, viii, 135 p.

WEST CLEAR CREEK RNA ca 700 ac.
Walker Mountain Quadrangle (USGS 7.5')



LITTLE COSTILLA PEAK RESEARCH NATURAL AREA

Carson National Forest, Questa District, New Mexico

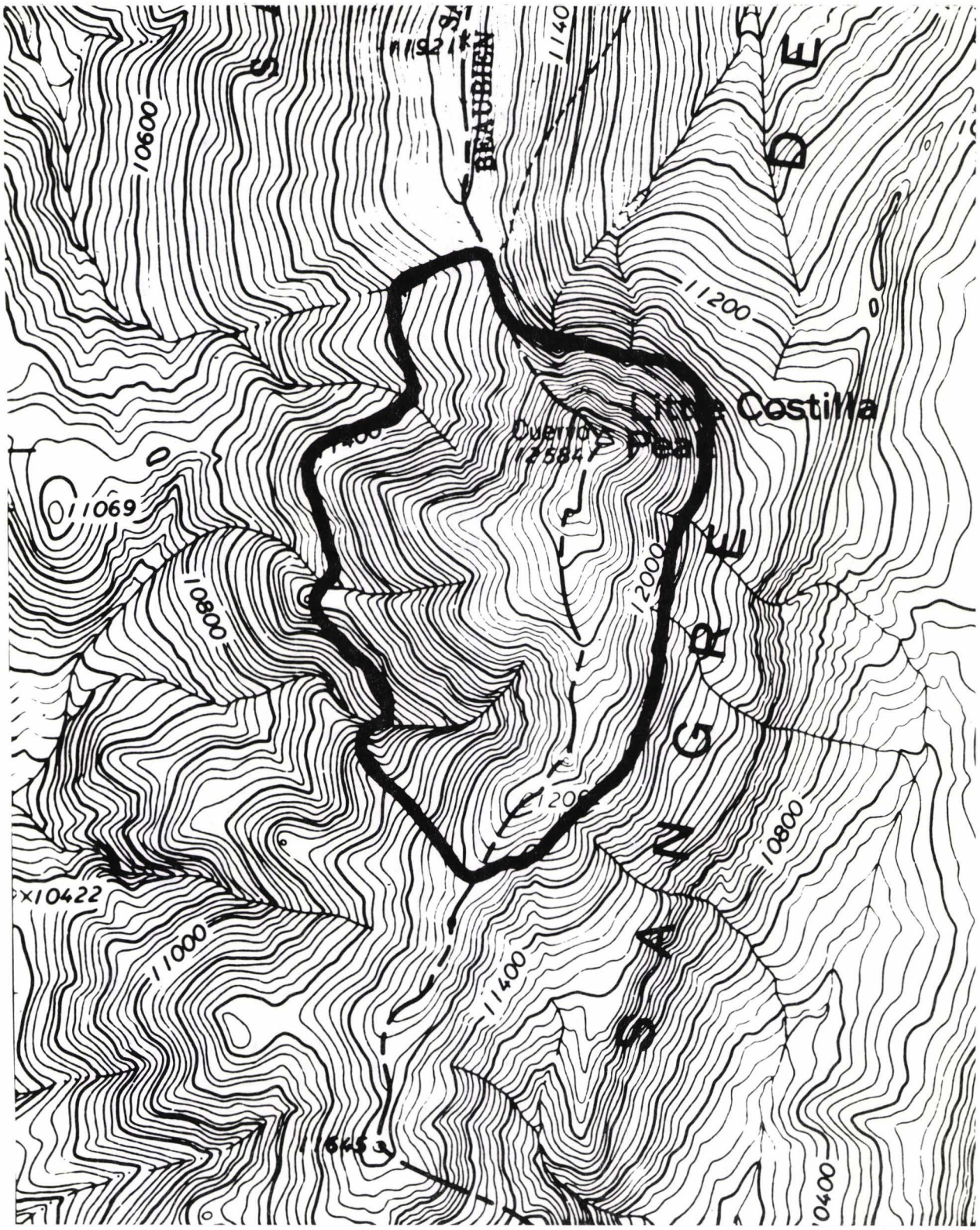
Primary Ecosystem: 111.5 Rocky Mountain alpine tundra

650 acres (263 ha)

The tundra of Little Costilla Peak exists as a small, isolated island above about 11,800 feet (3600 m) elevation. Here tundra is expressed under dry, windswept, and exposed alpine conditions. A turf of Kobresia bellardi occurs on the lower third of the alpine on the west side of the peak. The gentle slopes along the south ridge admit little snow accumulation and receive very high summer insolation. Here are found essentially fellfield plant communities with a high coverage of lichens. Cushion plants include Arenaria obtusiloba, Eritrichium nanum var elongatum, Paronychia pulvinata, Silene acaulis, and Trifolium nanum.

The best examples of krummholz are found on the east side of the peak where dwarf Engelmann spruce and bristlecone pine occur. Included within the research natural area on steep northwest-facing slopes from 11,400 feet (3480 m) to timberline is a tract of closed timberline forest of Engelmann spruce and subalpine fir.

LITTLE COSTILLA PEAK RNA 650 ac.
Ash Mountain Quadrangle (USGS 15')



ARELLANO CANYON RESEARCH NATURAL AREA

Carson National Forest, Penasco District, New Mexico

Primary Ecosystem: 121.31 spruce-fir forest

641 acres (260 ha)

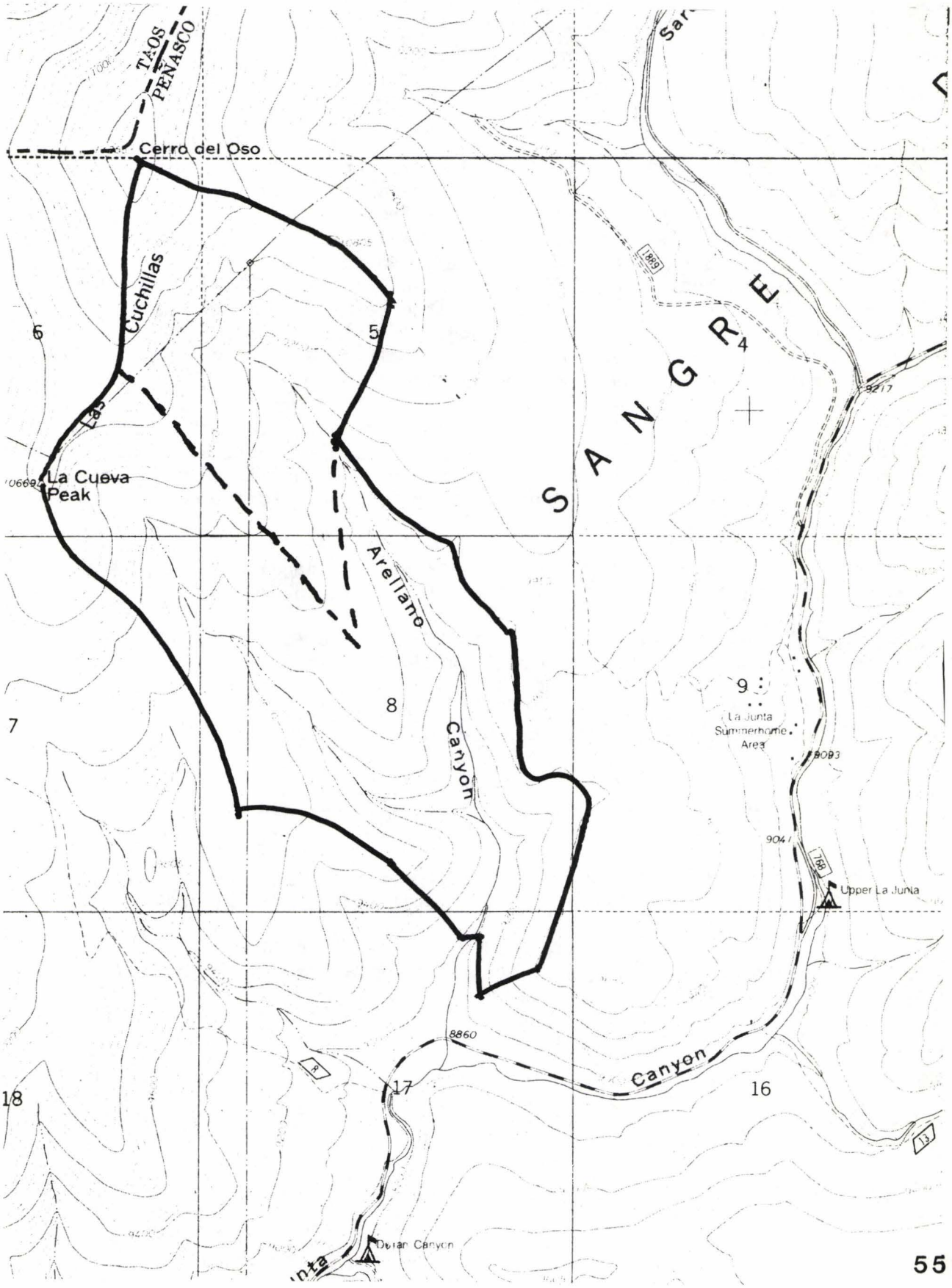
This area features different types of coniferous forests in steep mountain topography from La Cueva Peak (10,670 ft., 3254 m) into Arellano Canyon (lowest elevation 8800 ft., 2684 m). These forests have been described by Develice et al. (1983) and include the following (see map on following page): (1) blue spruce streamsides; (2) Engelmann spruce-corkbark fir-blue spruce streamsides; (3) Engelmann spruce-corkbark fir-white fir-Douglas fir-aspen; (4) Douglas fir old growth; (5) white fir-Douglas fir-ponderosa pine; and (6) Engelmann spruce-corkbark fir-bristlecone pine.

Good examples of old-growth, and both intermediate and late successional stages of these forests are found in this RNA. The streamside forests feature luxuriance and diversity of both shrubs and herbs and represent excellent riparian condition along small permanent streams.

Reference (includes studies in this or nearby areas):

DeVelice, Robert L., John A. Ludwig, William H. Moir, and Frank Ronco, Jr. 1983. A classification of forest habitat types in northern New Mexico and southern Colorado. USDA Forest Serv. Gen. Tech. Rep. RM- in preparation.

ARELLANO CANYON RNA 641 ac.
Cerro Vista Quadrangle (USGS 7.5')



BUCK MOUNTAIN RESEARCH NATURAL AREA

Lincoln National Forest, Smokey Bear District, New Mexico

Primary Ecosystem: 121.31 corkbark fir

727 acres (294 ha)

This area contains spruce-fir forests on sites and exposures mostly between 10,000-10,600 feet (3050-3200 m) elevation. This boreal forest environment is insular in nature and contains examples of spruce-fir and associated plant communities at their southernmost geographical limits in North America. The most extensive forest is of the corkbark fir/cardamine groundsel (Abies lasiocarpa/Senecio sanguisorboides) habitat type. Old-growth stands contain massive specimens of the largest corkbark fir in the United States. This area contains unique populations of Abies lasiocarpa var arizonica as robust, long-lived (oldest trees exceed 300 years) ecotypes. In addition to old-growth, other spruce-fir stands exist in intermediate and late seral stages as described by Dye and Moir (1977).

Other vegetation within this RNA includes meadows dominated by thurber fescue (Festuca thurberi) or bluegrass (Poa pratensis) and small groves of aspen (Populus tremuloides). An open forest of Douglas-fir (Pseudotsuga menziesii) and thurber fescue occurs as forest border along upper slopes of Buck Mountain.

A small, semipermanent stream (first order drainage) within the RNA is one of the headwater tributaries of North Fork Ruidoso Creek.

Several studies have occurred in this RNA. The following publications are based, at least in part, upon studies within this area.

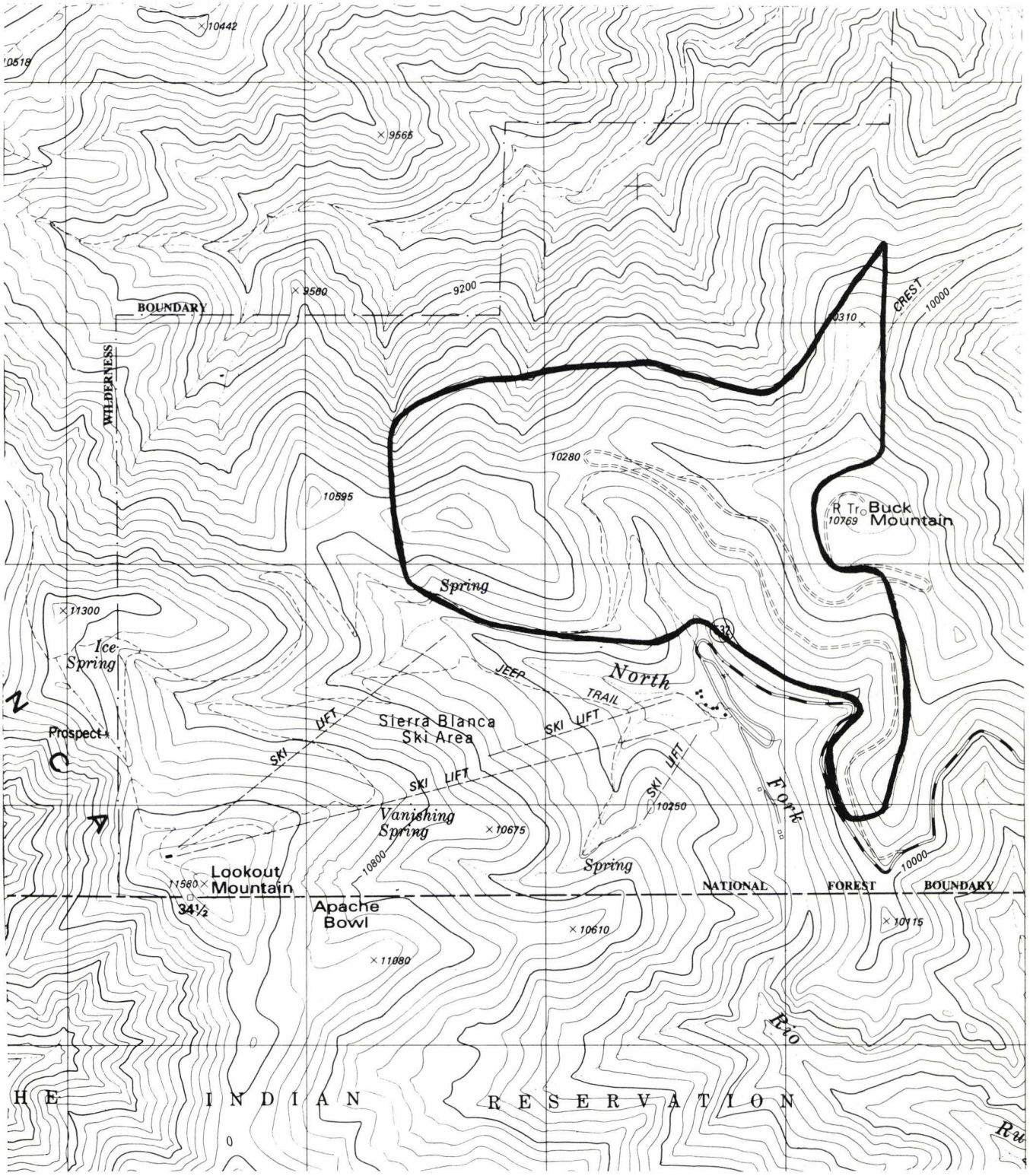
Dye, A. J. and W. H. Moir. 1977. Spruce-fir forest at its southern distribution in the Rocky Mountains, New Mexico. Amer. Midl. Nat. 97:133-146.

Egan, Robert S. 1972. Catalog of the lichens of New Mexico. The Bryologist 75: 7-35.

Moir, W. H. 1967. The subalpine tall grass, Festuca thurberi, community of Sierra Blanca, New Mexico. Southw. Nat. 12: 321-328.

Moir, W. H. and J. A. Ludwig. 1979. A classification of spruce-fir and mixed conifer habitat types of Arizona and New Mexico. USDA For. Serv. Res. Pap. RM-207, 47 p.

BUCK MOUNTAIN RNA 727 ac.
Nogal Peak Quadrangle (USGS 7.5')



CLAYTON PASS RESEARCH NATURAL AREA

Carson National Forest, Questa District, New Mexico

Primary Ecosystem: 121.32 bristlecone pine - limber pine

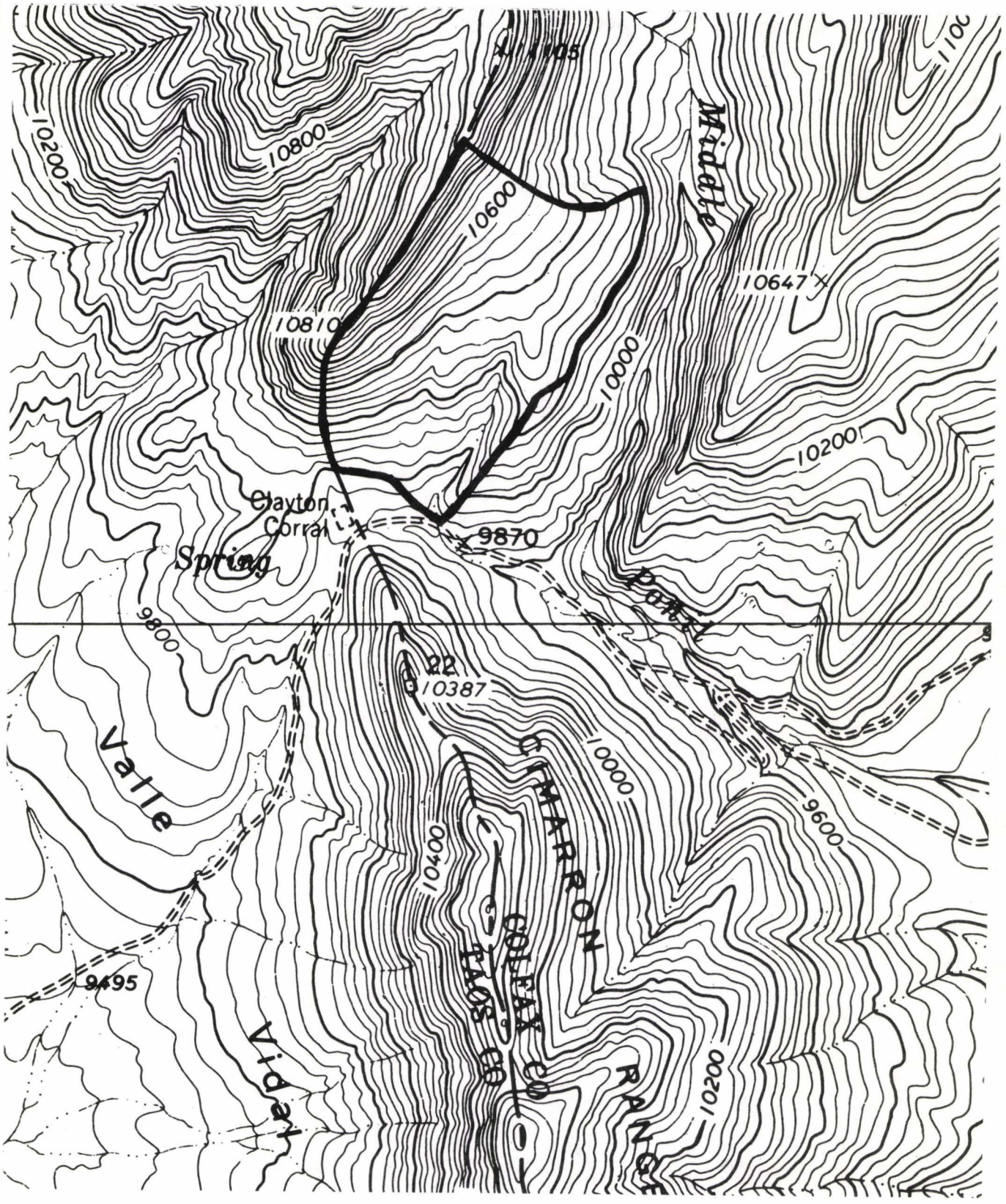
300 acres (122 ha)

This area contains vigorous stands of bristlecone pine (Pinus aristata) mostly on southerly and southeast-facing slopes between 10,000 and 10,600 feet (3050 and 3230 m) elevation. On the moderate lower slopes that adjoin grassy meadows bristlecone pine has been an invader into thurber fescue and Kentucky bluegrass meadows within the century. On steeper midslopes all-aged stands of pure bristle-cone pine can be found on soils classified as Dystric Cryochrepts. Extremely cobbly phases of this soil appear to favor nearly pure stands of aspen (Populus tremuloides). Stands can also be found where aspen dominates the overstory and bristlecone pine is regenerating and growing beneath. Some of the bristlecone pines in this research natural area are noteworthy for size and vigor. One specimen at 19 inches (48 cm) dbh and 61 feet tall (18.6 m) was about 300 years old at breast height age. Occasional bristlecone pine snags suggest that the area has long been a bristlecone pine site.

Engelmann spruce is locally present within the area, but there is scant evidence of its ever developing into a climax closed forest.

Reconnaissance has yielded a preliminary checklist of about 130 taxa of vascular plants in the area. Some of the major species found within mature bristlecone pine stands include snowberry (Symphoricarpos oreophilus), current (Ribes cereum), fleabane (Erigeron subtrinervis), Thurber and Arizona fescues (Festuca thurberi), F. arizonica), junegrass (Koeleria macrantha), parry oatgrass (Danthonia parryi), and vetch (Vicia americana).

CLAYTON PASS RNA 300 ac.
Ash Mountain Quadrangle (USGS 15')



HAYNES CANYON RESEARCH NATURAL AREA

Lincoln National Forest, Cloudcroft District, New Mexico

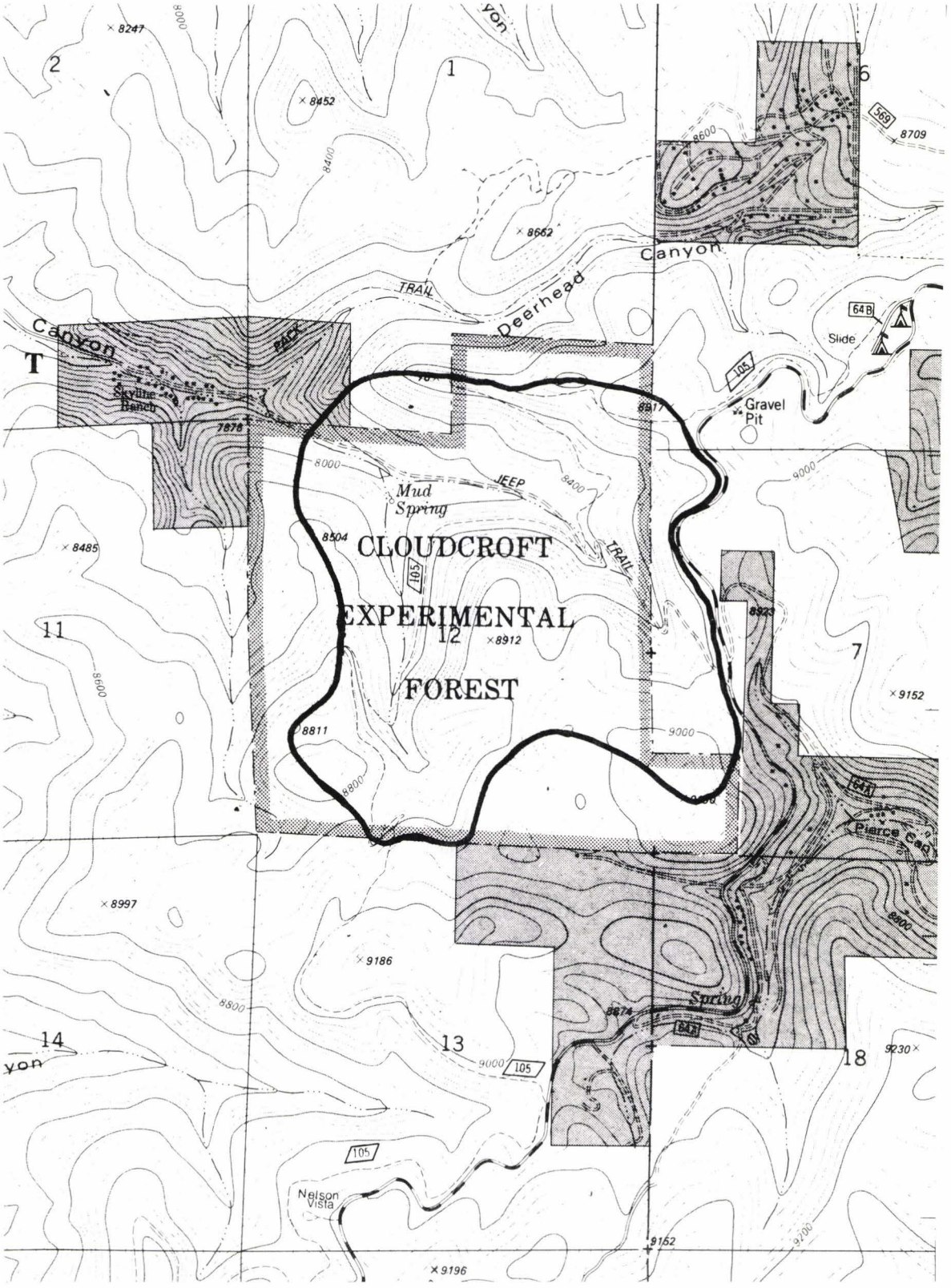
Primary Ecosystem: 122.31 mixed conifer forest

610 acres (294 ha)

This area contains mixes of white fir (Abies concolor) habitat types on mostly steep mountain topography with elevations between 7,900-9,500 feet (2410-2900 m). Forests of the white fir/Rocky Mountain maple habitat type occur generally on the north-facing slopes. Tall, old-growth stands alternate with young seral stages in a patchwork mosaic. South-facing slopes are mostly in gambel oak stages of the white fir/gambel oak habitat type. Lower slopes and forested ravines contain stands of the white fir/big-toothed maple habitat type. At lowest elevations canyon bottoms exhibit cumulic soils with gully incision. Bluegrass sod (Poa pratensis) extends between stringers of Douglas-fir, occasional ponderosa pine, and white fir. Large specimens of big-toothed maple (Acer grandidentatum) are found. These various mixed conifer habitat types have been described by Alexander et al. (1984). This area was formerly a part of the Cloudcroft Experimental Forest.

Alexander, B. G., Frank Ronco, Jr., E. Lee Fitzhugh, and J. A. Ludwig. 1984. A classification of forest habitat types of the Lincoln National Forest, New Mexico. USDA Forest Serv. Gen. Tech. Rep. RM-104, 29 p.

HAYNES CANYON RNA 610 ac.
High Rolls Quadrangle (USGS 7.5')



LARGO MESA RESEARCH NATURAL AREA

Gila National Forest, Quemado District, New Mexico

Primary Ecosystem: 122.41 pinyon-juniper woodland

300 acres (122 ha)

Woodland of pinyon (Pinus edulis) and one-seed juniper (Juniperus monosperma) occurs atop the flat, 8000 feet (2440 m) summit of Largo Mesa. The mesa is a geologically eroded remnant of ash flows of the Datil Formation. Geologic slope retreat resulted in a steep, 400 foot (120 m) scarp at whose base is a dissected piedmont of both coarse detritus and finer textured alluvial drainages. The scarp, its piedmont, and the mesa top all contain woodland, whereas the surrounding lowlands are blue grama (Bouteloua gracilis) grasslands. The generally steep terrain and elevational differences between the mesa top and lowland grassland results in lessened livestock grazing use of the summit woodland.

The woodland consists of apparently stable-aged populations of both pinyon pine and one-seed juniper. Taller pinyon attain heights around 25-30 feet (8-9 m), and large, old specimens of both species are seen. Canopy coverage of the trees varies from 30 percent along the drier, south rim of the mesa top to about 70 percent on the gentle northerly slopes and slight drainages. A grass layer is continuous beneath and between the trees. Blue grama constitutes perhaps 95 percent of the total coverage, while littleseed ricegrass (Oryzopsis micrantha) grows under many of the trees. The grass layer is remarkably uniform throughout the area. Other grasses are infrequent, including junegrass (Koeleria macrantha), spike muhly (Muhlenbergia wrightii), needle-and-thread (Stipa speciosa), squirreltail (Sitanion hystrix), pine dropseed (Blepharoneuron tricholepis), and sedge (probably Carex geophila).

Shrubs are uncommon. There are occasional mountain mahogany (Cercocarpus montanus var paucidentata) var paucidentata) mostly in good browse condition. There are but few invador or increasor shrubs as pingue (Hymenoxys richardsonii), rabbitbrush (Chrysothamnus sp.), and snakeweed (Gutierrezia sarothrae).

LARGO MESA RNA 300 ac.
Canon Largo 4NE Quadrangle (USGS 7.5')

MESITA DE LOS LADRONES RESEARCH NATURAL AREA

Santa Fe National Forest, Las Vegas District, New Mexico

Primary Ecosystem: 122.41 juniper savanna

500 acres (200 ha)

This tract of juniper savanna is situated atop a butte that gently slopes easterly from an elevation of 5865 feet (1790 m) to about 5750 feet (1750 m). The butte is sandstone partially capped by limestone. The isolation of this butte and its general inaccessibility to domestic livestock have resulted in vegetation in advanced stages of succession after at least 70-80 years of minimum influence by man or his animals.

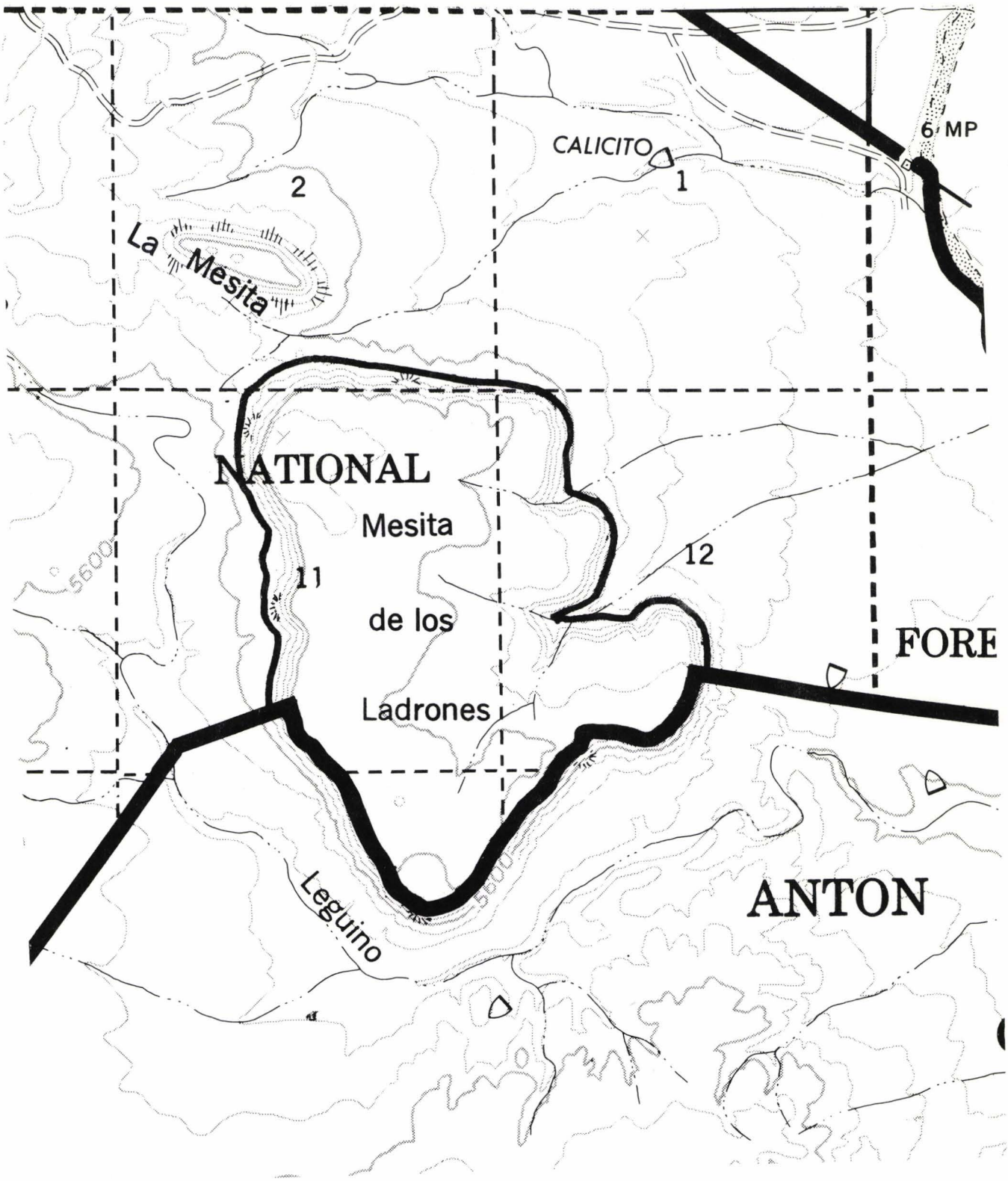
Since the topography and soils of this mesa top varies, a variety of vegetation and often conspicuous vegetation mosaics exist. The most widespread of these are the open savannas of one-seed juniper (Juniperus monosperma). Occasional small pinyon (Pinus edulis) are also found. The canopy coverage of these conifers total about 10-15 percent. The herbaceous layer of these savannas ranges from about 50-65 percent canopy coverage. Grasses dominate, usually with marked shifts in composition from site-to-site. Some of the common species of the savannas are blue grama (Bouteloua gracilis), black grama (Bouteloua eriopoda), sideoats grama (Bouteloua curtipendula), and New Mexico feather grass (Stipa neomexicana).

Treeless swales also occur on a significant portion of the mesa top. On these heavy textured soils of gentle drainageways are populations of cholla (Opuntia imbricata) among a dense grassy matrix of blue and sideoats gramas and vine mesquite (Panicum obtusum).

Other vegetation includes a small area of ponderosa pine on rockland at the south end of the mesa and a rim of shrubby vegetation (Quercus undulata, Rhus aromatica) on rock outcrop and talus around the mesa.

On the basis of several reconnaissance trips, approximately 150 taxa of vascular plants have been noted in this research natural area.

MESITA DE LOS LADRONES RNA 500 ac.
Apache Springs Quadrangle (USGS 15')



GUADALUPE MOUNTAIN (North McKittrick Cr) RESEARCH NATURAL AREA

Lincoln National Forest, Guadalupe District, New Mexico

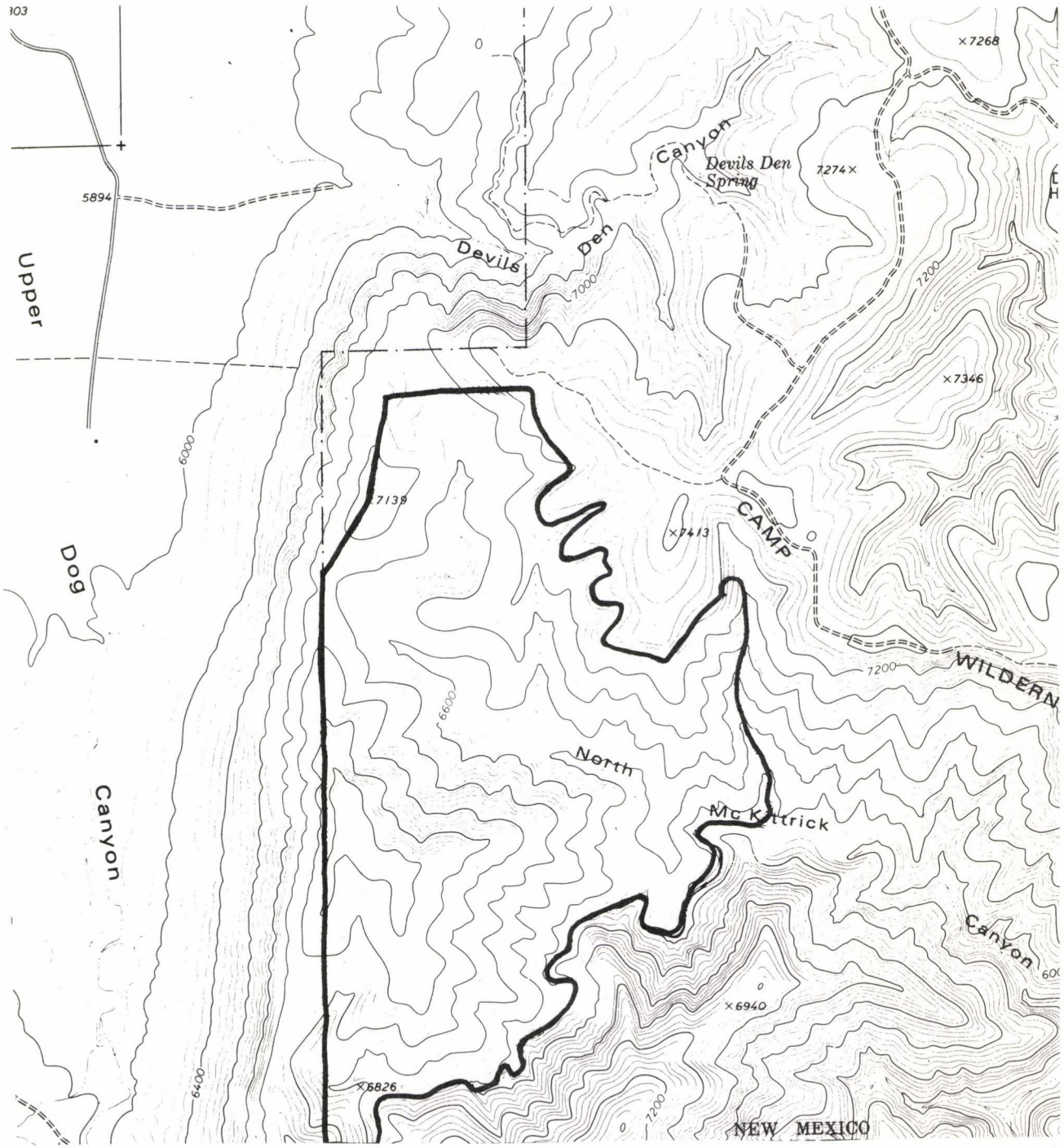
Primary Ecosystem: 133.34 mountain mahogany

827 acres (335 ha)

This ecosystem is dominated by mountain mahogany. It is a relatively young stand and it is far enough from water that it does not receive livestock use. Other plants in the association are sacahuista, sotol, wavyleaf oak, New Mexico muhly, deergrass and some pinon.

There are many areas in Region 3 that produce mountain mahogany. However, most of them are heavily overused by livestock and big game. This area has a particularly healthy and vigorous stand of mahogany.

GUADALUPE MOUNTAIN RNA 827 ac.
El Paso Gap Quadrangle (USGS 7.5')



CANADA BONITO RESEARCH NATURAL AREA

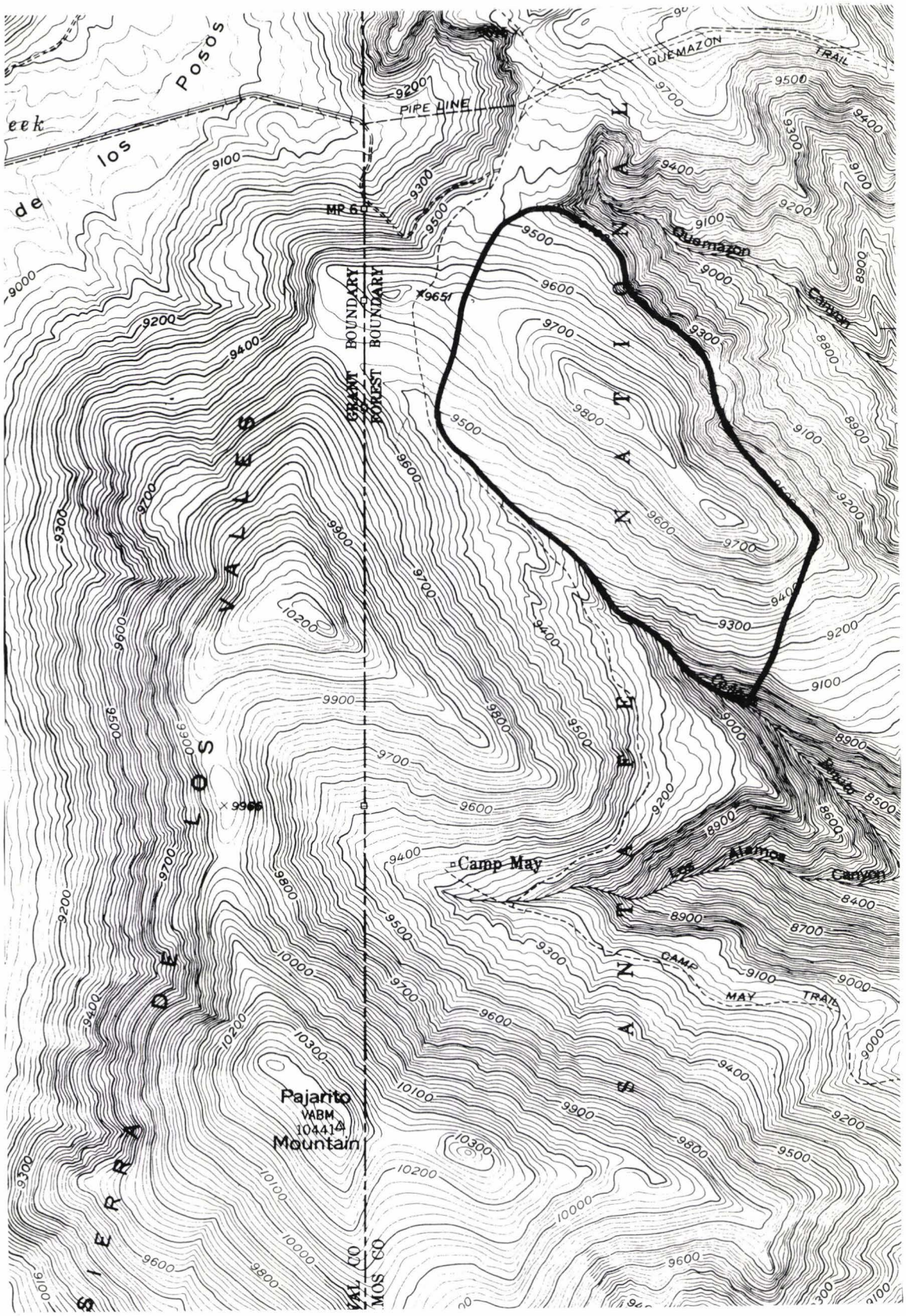
Santa Fe National Forest, Espanola District, New Mexico

Primary Ecosystem: 141.41 thurber fescue meadow

300 acres (122 ha)

Canado Bonito research natural area is an example of outstanding high elevation (9,200-9,700 feet or 2800-2960 m) thurber fescue (Festuca thurberi) community at or very near its climax expression. This park surrounded by spruce-fir and aspen forests has no known grazing by domestic livestock for at least 44 years when the area was withdrawn as a defense facility. Thurber fescue meadows are dominant on 20 to 30 percent south-facing slopes. Occasional, isolated conifers punctuate the grass dominated vegetation. On upper slopes and ridgetops are patches and mosaics of aspen which often provide abrupt contrast to the fescue meadows. Steeper north-facing slopes within or adjoining this research natural area have closed forests of Engelman spruce and corkbark fir.

CANADA BONITO RNA 300 ac.
Valle Toledo Quadrangle (USGS 7.5')



BERNALILLO WATERSHED RESEARCH NATURAL AREA

Cibola National Forest, Sandia District, New Mexico

Primary Ecosystem: 142.12 Grama-galleta steppe

1120 acres (454 ha)

The Bernalillo Watershed Protection Project began in 1953 to improve watershed conditions and mitigate flood damage from runoff at the foothills of the Sandia Mountains. Work on this project consisted of contour terracing, soil pitting, and deep ripping or chiselling the soil. The work began February 1954 and was completed by September 1955. All areas disturbed by construction were seeded to grasses suitable to the area. Chamiza and other soil holding shrubs were planted by Albuquerque cub scouts as their conservation contribution. Livestock have been excluded from the area since 1950.

Today native grasses and shrubs provide almost continuous cover on these gently sloping piedmont alluvial fans. The principal grasses are black grama (Bouteloua eriopoda), blue grama (Bouteloua gracilis), sand dropseed (Sporobolus cryptandrus), and various three awns (Aristida spp.). Occasional grasses include galleta (Hilaria jamesii), ring muhly (Muhlenbergia torreyi), bottlebrush squirreltail (Sitanion hystrix), and especially along washes, sideoats grama (Bouteloua Curtipendula). Low shrubs include snakeweed (Gutierrezia sarothrae), plains yucca (Yucca glauca), chamiza (Atriplex canescens), cholla (Opuntia imbricata), and prickly pears (Opuntia polyacantha, O. phaeacantha). These grasslands commonly display cappings of cryptogams (lichens, mosses, algae) on the soil crust. Occasional one-seed juniper (Juniperus monosperma) occur, but densities on these convex interfluve surfaces seldom exceed about three trees per acre.

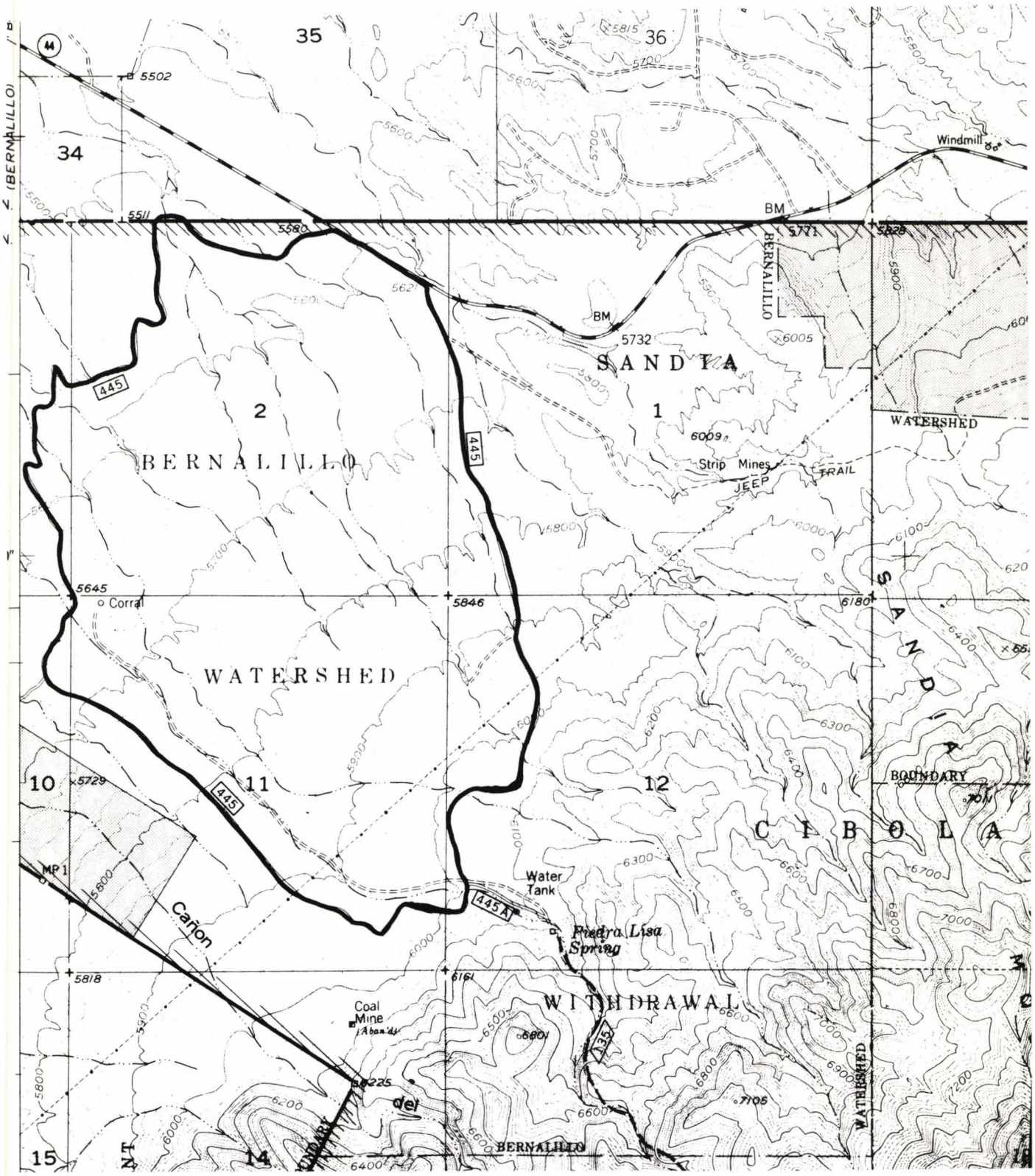
Gravelly draws and broad washes are lined with populations of apache plume (Fallugia paradoxa) and rabbitbrush (Chrysothamnus nauseosus).

Studies have been conducted on the area under auspices of the USFS Rocky Mountain Station and University of New Mexico. Much interest has been placed on contrasts between this area as control and adjoining grasslands along alluvial piedmonts in central New Mexico where various livestock grazing systems are being practiced.

Reference:

USDA Forest Service. nd. Tour guide to Bernalillo Watershed protection project, Cibola National Forest. Mimeo. 9 p. USFS Southwestern Region.

BERNALILLO WATERSHED RNA 1120 ac.
Placitas Quadrangle (USFS 7.5')



RABBIT TRAP RESEARCH NATURAL AREA

Gila National Forest, Silver City District, New Mexico

Primary Ecosystem: 143.11 scrub-grassland

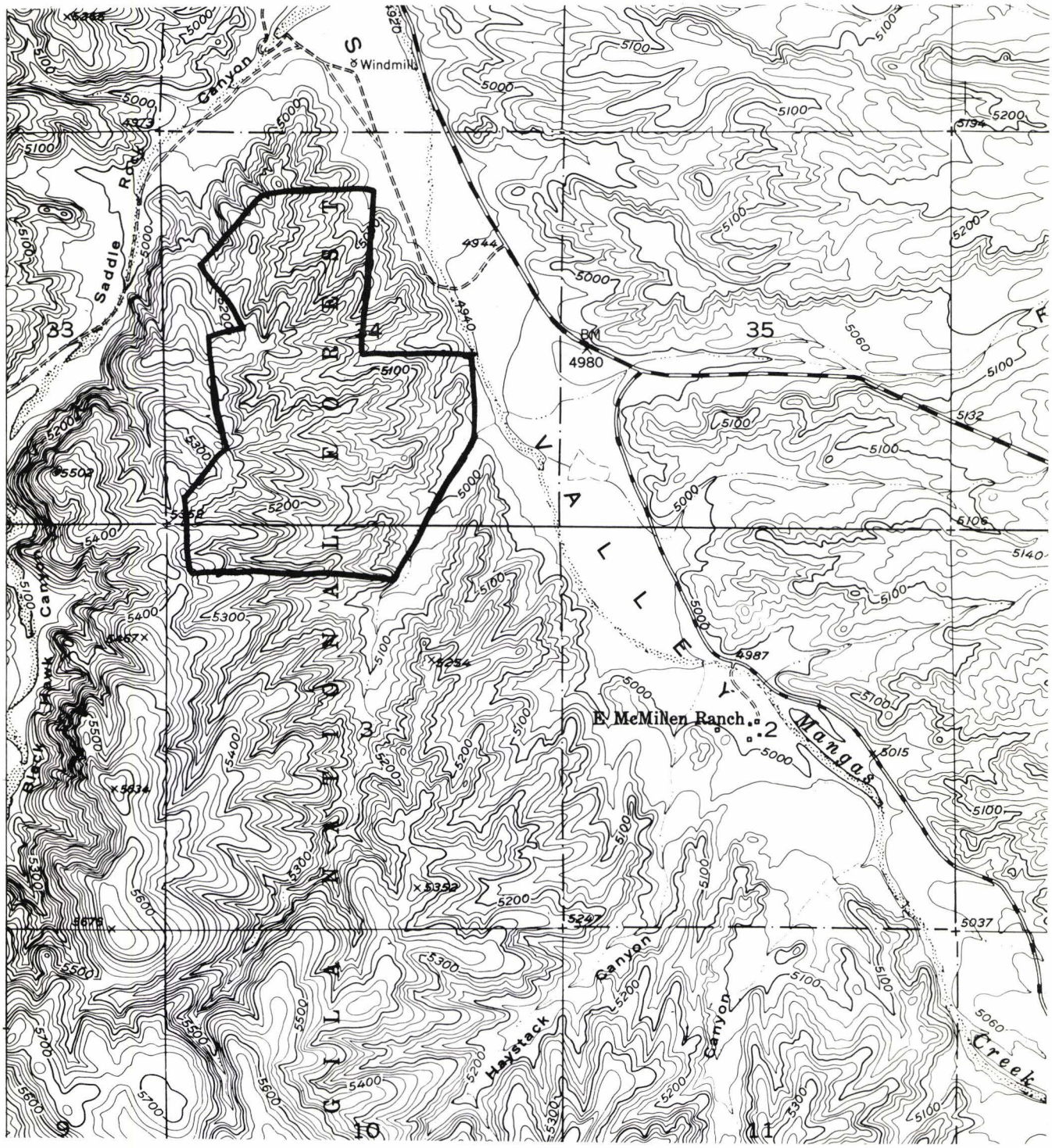
300 acres (122 ha)

Deep, old (Pleistocene) valley fill alluvium in the Mangas Valley are deposits of mixed andesites, rhyolites, and a variety of "granitic" type soil parent materials. This strongly dissected alluvium drains generally northeasterly. The strong topographic relief is responsible for the variety of plant communities near the boundary of a steppic climate (indicated by mixed gramas, mesquite, and soaptree yucca) and a juniper savanna climate (indicated by red-berry juniper, turbinella oak, and grasses).

The general vegetation of the 297-acre Rabbit Trap Exclosure is indicated on the 1970 map (Mangas Valley Allotment) as a sideoats gramablue grama-wolftail grassland in fair and improving condition. The area has been fenced to exclude livestock grazing since the mid 1940s. When revisited in November 1982 the fence was observed to be in generally good repair. The general vegetation of north and easterly slopes is a scrub oak savanna while warmer, drier slopes support mixed grama and associated grasses with occasional mesquite and soaptree yucca. All vegetation appeared to be in good range condition and static or somewhat improving in trend. A mix of valuable and highly palatable perennial grasses is found as well as many browse plants (A and B species on browse condition scorecards) in good vigor.

Some of the plants by vegetation type (S = scrub oak savanna, G = mesquite grassland, A = alluvial bottom grassland) and abundance (vc = very common, c = common, o = common, o = occasional, i = infrequent) include:

RABBIT TRAP RNA 300 ac.
Circle Mesa Quadrangle (USGS 7.5')



TREES AND SHRUBS

Acacia constricta G,o
Baccharis pterioinoides G,A,i
Brickellia californica A,i
Ceanothus greggii G,o
Cercocarpus montanus S,o
Dalea formosa G,o
Fallugia paradoxa A,c
Fendlera rupicola S,c
Gutierrezia sarothrae S,G,A,o
Haplopappus tenuisectus S,i
Hymenoclea monogyra A,c
Juniperus Erythrocarpa S,o
Juniperus deppeana S,A,i
Mimosa biuncifera G,c
Pinus edulis S,i
Prosopis glandulosa G,o
Quercus grisea x turbinella S,c
Quercus turbinella S,vc
Rhus aromatica S,o
Sapindus saponaria A,i
Senecio douglasii v. longilobus
Yucca baccata S,i
Yucca elata G,o

GRAMINOIDS

Aristida fendleriana c
Aristida longiseta o
Aristida pansa o
Aristida ternipes o
Aristida spp. c
Andropogon barbinodis G,o
Bouteloua curtipendula A,G, vc
Bouteloua eriopoda G,c
Bouteloua gracilis c
Bouteloua hirsuta c
Cyperus sp. o
Erioneuron pulchellum G,o
Hilaria belangeri o
Hilaria mutica i
Koeleria pyramidata o
Leptochloa dubia A,c; G,o
Lycurus phleoides G,o
Muhlenbergia porteri G,c; S,o
Muhlenbergia torreyi G,i
Panicum hallii G,o
Panicum obtusum o
Poa fendleriana S,i
Setaria macrostachya o
Muhlenbergia porteri G,c S,o
Muhlenbergia torreyi G,i
Panicum hallii G,o
Panicum obtusum o
Poa fendleriana S,i
Setaria macrostachya o
Sitanion hystrix o
Stipa spp. G,c S,c
Tricachne californica o
Tridens muticus G,i

HALFSHRUBS AND FORBS

Artemisia ludoviciana o
Artemisia campestris c
Baileya multiradiata A,G
Artemisia carruthii c
Calliandra sp. G,c
Coryphantha scheeri i
Coryphantha vivipara i
Curcurbita foetidissima A,o
Eriogonum wrightii A,G,S
Echinocereus sp. o
Leucelene ericoides G,o
Melampodium leucanthum G,i
Opuntia phaeacantha o
Opuntia spinosior i
Nolina microcarpa S,i
Phlox cf austromontana O
Solanum eleagnifolium A,i
Zinnia cf acerosa G,o

LITTLE WATER CANYON RESEARCH NATURAL AREA

Cibola National Forest, Mount Taylor District, New Mexico

Primary Ecosystem: 222.31 blue spruce forest

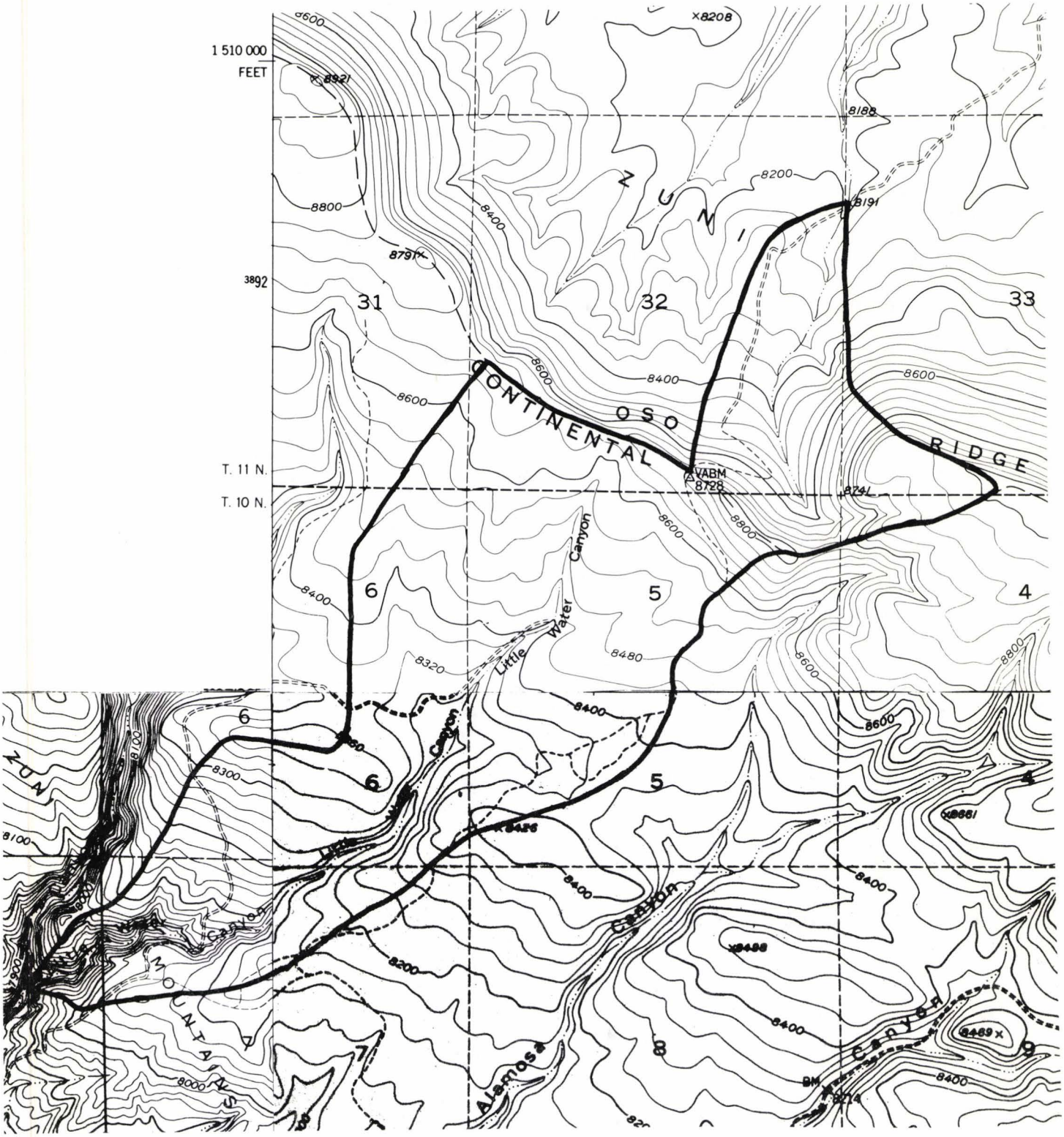
950 acres (385 ha)

Blue spruce (Picea pungens) grows in nearly pure stands along the bottom of Little Water Canyon at elevations between 7,900-8,250 feet (2410-2520 m). This riparian forest is virtually pristine, doubtless because of the rugged nature of the canyon which prevented the logging of spruce. Several trees come close to record sizes for this species. Forests along this perennial stream are of the Picea pungens/Cornus stolonifera habitat type. The understory is impressive because of its diversity of shrub and herbaceous plants. Many of the 108 plant taxa encountered on a single visit to the area occur as streamside forest elements.

The upper slopes are relatively open with ponderosa pine and gambel oak dominating on lithic, skeletal soils derived from sandstone. About 40 percent of the upper drainage into Little Water Canyon is rock outcrop. As the canyon narrows and the canopy begins to close, Douglas-fir is encountered (8400 feet or 2560 m). Gambel oak is still prominent, but diversity increases and both Rocky Mountain juniper (Juniperus scopulorum) and aspen (Populus tremuloids) are found. Water is spotty below the first Douglas-fir, and most of the canyon is dry until blue spruce is encountered.

Another noteworthy community is located on lower slopes of Oso Ridge to the northeast. Here are large specimens of gambel oak (Quercus gambelii) thriving amid swards of bluegrass (Poa pratensis) and occasional aspen on apparently deep cumulic swale soils.

LITTLE WATER CANYON RNA 950 ac.
Mt. Sedgwick Quadrangle (USGS 7.5')
Valle Largo (USGS 7.5')
Paxton Springs (s) (USGS 7.5')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TURKEY CREEK RESEARCH NATURAL AREA

Gila National Forest, Wilderness District, New Mexico

Primary Ecosystem: 223.22 mixed broadleaf riparian forest

1335 acres (540 ha)

Riparian forest occurs at about 5000 feet (1520 m) elevation along perennial streams (Turkey Creek and Skeleton Canyon Creek) at the south border of the Gila Wilderness. The topography is very rough with narrow canyon bottoms and steep slopes and rock outcrops on either side. Riparian plants include sycamore (Platanus wrightii), narrow leaf cottonwood (Populus angustifolia), alder (Alnus oblongifolia), ash (Fraxinus pennsylvanica var velutina), box elder (Acer negundo), chokecherry (Prunus serotina var rufula), and walnut (Juglans major). Other canyon bottom trees include Chihuahua pine (Pinus leiophylla), silver leaf oak (Quercus hypoleucoides), netleaf hackberry (Celtis reticulata), New Mexico locust (Robinia neomexicana), and white fir (Abies concolor).

The riparian vegetation in the canyon and the rock formations on either side afford habitat for many of the birds of the upper portions of the Gila River Watershed. This is one of the areas in the Southwest where both faunal and botanical diversity can be relatively easily protected because of the rough topography and isolation. (The riparian bottom receives occasional livestock use when high water washes out the watergaps on the south end of the area). (See map)

The fauna of this area has been the subject of a number of reports submitted as manuscripts to the Gila National Forest. The following are noted:

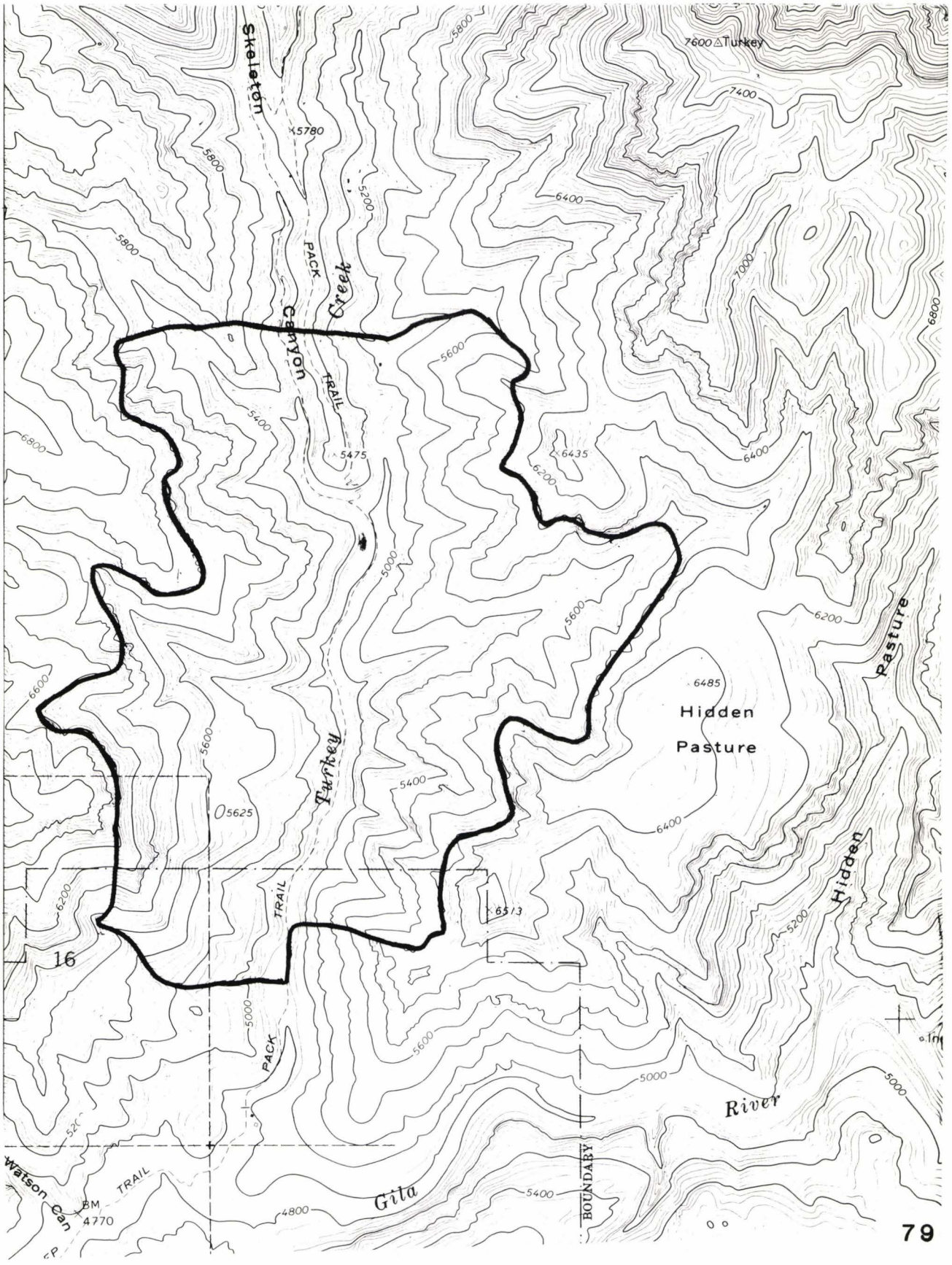
Hayward, B. J. and D .L. Hunt, Jr. 1972. Vertebrate survey of the Wilderness Ranger District, Gila National Forest, 58 p.

USDA Forest Service. 1969. Establishment Report, Turkey Creek Research Natural Area, Gila National Forest, 9 p.

Zimmerman, Dale A. n.d. The Gila River valley in southwestern New Mexico as an important wildlife resevoir, 12 p.

Zimmerman, Dale A. 1970. Birds and bird habitats on national forest lands in the Gila River valley, southwestern New Mexico, 44 p.

TURKEY CREEK RNA 1335 ac.
Canyon Hill Quadrangle (USGS 7.5')



McCRYSTAL MEADOW RESEARCH NATURAL AREA

Carson National Forest, Questa District, New Mexico

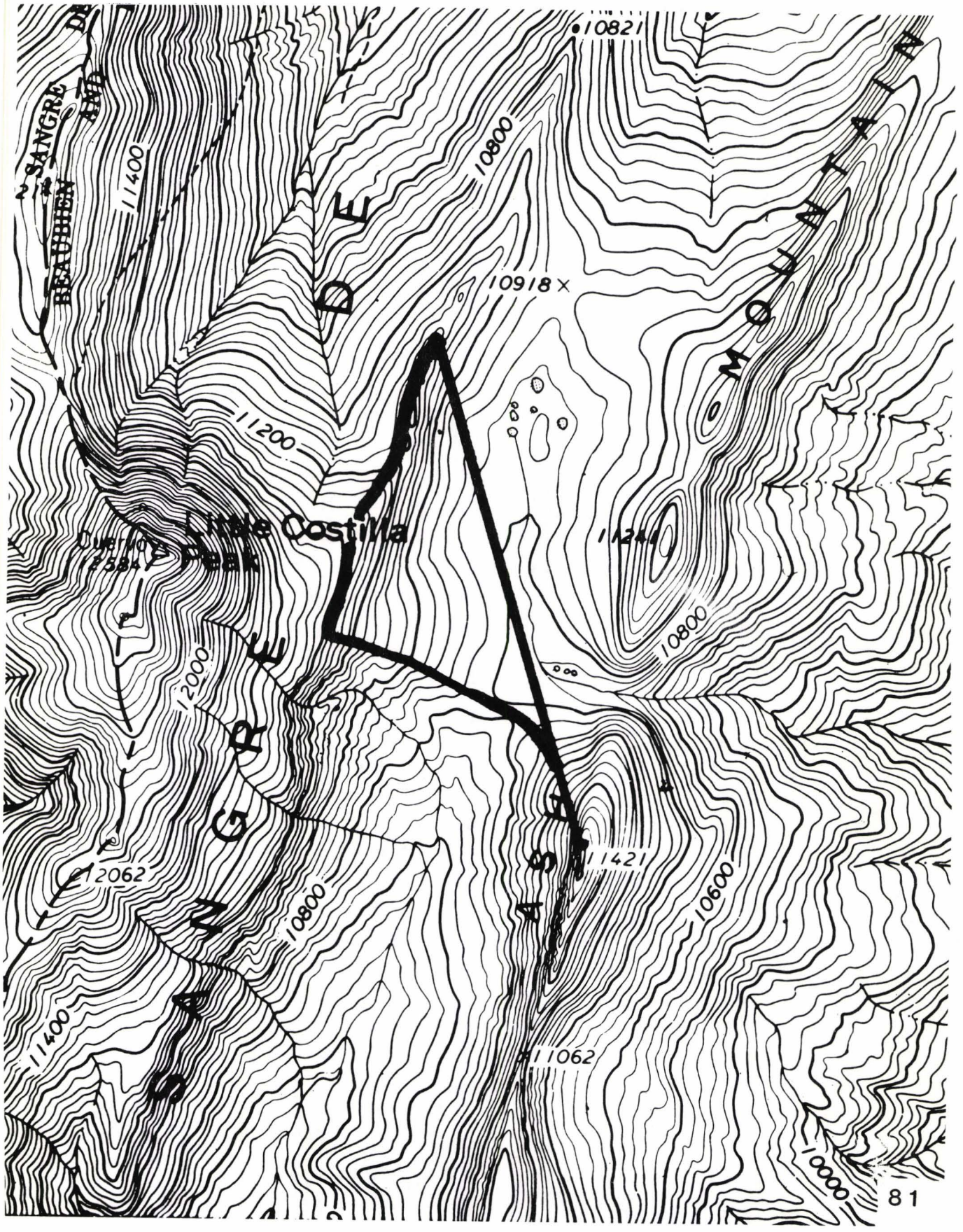
Primary Ecosystem: 242.4 Wet Meadow

Acreage to be determined

This RNA features marsh in a high elevation (10,600 feet, 3,230 m) post-glacial landscape. The marsh is pocked with small glacial lakes (karsts), and bounded to the south by glacial moraine. The soil is very rare for the Southwest--a deep, organic soil derived primarily from undecomposed remains of sedges (probably a Typic Cryofibrist). This peat offers an outstanding possibility for documenting climatic and vegetational changes during the late Pleistocene and Holocene by means of pollen stratification. The area is also important as summer elk pasture and has been managed as such during recent years.

Sedges dominate the vegetation and doubtless comprise the bulk of the recently accumulated peat. Common species include Carex aquatilis and C. nebraskensis. Where mineral soils (Cumulis cryaquolls) occur, the wet meadow vegetation becomes more diverse. Wet meadow grasses include Calamagrostis inexpansa, Hordeum brachyantherum, Deschampsia caespitosa, and species of Agrostis. Other herbs include Juncus arcticus ssp ater, J. austromontana, and such broad-leafed plants as Swertia perennis, Gentiana thermalis, Parnassia parviflora, Pedicularis groenlandica, and Polygonum viviparum.

McCRYSTAL MEADOW RNA
Ash Mountain Quadrangle (USGS 15')



APPENDIX B. Common Questions about Research Natural Areas

During the course of review of RNA planning at the Forest level, the Regional Task Group encountered many common questions and tried to answer them. Many answers can be found by directly consulting FSM 4063 and other legal documents, including the Regional Plan. The most common questions and issues are itemized below.

1. What are characteristics of RNA's?

   There are six general characteristics:

   a. Natural areas are part of a comprehensive system. The basis of this system is given in Table 3.1 of the Regional Guide. Members of the system are samples of typical environments, ecosystems in all their variety from all geographic zones and landscapes, or the important forest and range types including "special" community types.

   b. Minimum disturbance by man is an essential feature. What comprises minimum disturbance is a question of professional judgment based upon historical records, knowledge of succession, examination of relic areas, the ability of ecosystems to recover when man-caused impacts cease, or simply a long-term (30-50 years) record of protection, and whatever happened before. Minimum disturbance does not mean pristine, climax, primeval, or without outside influence upon ecosystems. All ecosystems are open systems of an earth biosphere dominated by man.

   c. Natural areas are ecological in scope and criteria. Emphasis is given to habitats, habitat types, communities, plant associations, soil-vegetation units (subgroup-subseries relationships of the Terrestrial Ecosystem Survey) range or forest "types".

   d. RNA's are given permanency and preservation to the greatest possible degree in order to evaluate natural (i.e., without man's modifications) processes of ecosystem dynamics.

   e. These withdrawals into protective status of ecosystems in relatively unmodified conditions are for purposes of "... research, study, observations, monitoring, and educational activities that are nondestructive, nonmanipulative, and that maintain unmodified conditions..." (FSM 4063.02).

   f. Natural areas harbor genetic stock of future value to society in such areas as agriculture, silviculture, medicine, horticulture, range management, landscape restoration, aesthetics, or wildlife management. There are numerous scientific papers on important uses of genetic reserves (both plant and animal) found within natural areas. These values are often of inestimable economic importance.

2. How do RNA's differ from other special management areas such as wilderness, botanical, zoological, geologic, or scenic areas?

RNA's emphasize research as stated in (e) above. Special management or land use areas are not necessarily (or even exclusively) oriented to the research, education, or monitoring functions.

3. Should RNA's be sought for, or emphasized, in wilderness?

Current National direction has been changed to allow establishment of RNA's within wilderness areas. Land managers and environmental preservation groups sometimes perceive RNA's as kinds of "little wildernesses" withdrawn for special interests. The logic continues that RNA's should, in some way, be linked to the wilderness philosophy. This is fallaceous. Wilderness areas and RNA's are two different and independent land management, and land use planning concepts. Yes, there is some commonness of purpose and value, but as well, important differences. Research, education, monitoring, and studies in ecosystems may or may not be satisfied in wilderness areas. In turn, wilderness management may or may not conflict with RNA management.

The consideration of potential RNA's within wilderness must involve both feasibility and compatibility. What about access? Is a wilderness ecosystem appropriate for scientific instrumentation, marking of trees, or other evidence of study? Can research sites be protected from influence of dispersed recreation, livestock grazing or other aspects of wilderness management? Evaluation of potential wilderness lands as possible RNA's should include the opportunity of using nearby sites as treatment, impact, or management areas in statistical design of experiments. Such considerations can lead planners to conclusions that RNA's on a case-by-case basis are appropriate in wilderness areas or not.

Of course, wilderness areas do not contain all the ecosystems managed on National Forests or National Grasslands in general. Certain RNA's established, recommended, or suggested in the future are necessarily outside of existing wilderness areas. If Region 3 confined its RNA locations inside wilderness boundaries, the representation of needs and opportunities given in Table 1 would be incomplete. On the other hand, some ecosystems whose extent on Forest lands managed outside wilderness are widespread exist in their best "minimally disturbed" condition within wilderness. If both wilderness and scientific-educational uses can be managed in a compatible fashion, as discussed above, then such ecosystems might be appropriately situated within wilderness. Establishment of RNA's provide additional protection and call attention to the scientific community that the area offers a scientific opportunity.

4. For ecosystems widespread in Region 3, why is any particular Forest responsible for providing the representative RNA example?

For widespread ecosystems it is usually appropriate to provide several examples in order to account for important geographic variants and range of diversity. For example, pinyon-juniper woodlands might include Utah juniper in northern Arizona, red-berried juniper south of the Mogollon Rim, and one-seed juniper in central New Mexico. Therefore, several Forests are usually requested to propose areas for RNA consideration. One or several areas might be recommended based upon criteria of (1) above and upon feasibility and potential conflicts with other land use possibilities.

Sometimes a particular Forest is indicated for finding a RNA possibility within the Regions's network. This is done when that Forest is known to have the most likely possibility of finding a suitable representation. If an ecosystem is widespread and typical of the lands managed by the USDA Forest Service in Region 3, the threat of its irreversible loss of diversity or departure from its natural, unmodified condition throughout the Region is sufficient grounds to indicate a particular Forest (where that ecosystem yet exists in minimal disturbance) for possible RNA siting. The threat of extinction of any natural ecosystem (the irreversible departure from its potential climax condition) is often the final argument that makes a particular RNA more valuable than any further commodity-oriented land management alternative.

5. Will research be done once an RNA is set up?

Definitely. Experience indicates that RNA's serve to focus research and help integrate research. RNA's have a good track record for research. In Region 3, perhaps the most intensive research has been conducted on the G. A. Pearson RNA, but studies are also found on most of the other established areas as well as within many of the recommended RNA's.

We anticipate that future research within RNA's will be even more intensive since control areas of minimally disturbed ecosystems become even more geographically restricted.

6. Does establishment of an RNA imply no management, i.e., let nature run the show?

Paragraph 4063.38 FSM states: "The Station Director with the approval of the Forest Supervisor may authorize management practices, except within wildernesses, necessary to preserve the vegetation for which the RNA's were created. These practices may include occasional grazing, control of excessive animal populations, or prescribed burning. Only tried and reliable techniques will be used, and then only where the vegetative type would otherwise be lost without management." Careful scientific evaluation and planning are the watch words in managing the areas.

7. What is the role of the RNA program to the Forest Land Management Planning (LMP) process?

A system of strategically located RNA's over the Forest landscape is considered by many land planners to be one of the essential ingredients of sound plans. RNA's are part of an environmental strategy of "insurance" against widescale irreversible change. This strategy calls for the uneven distribution of man's environmental influences in a way that preserves a broad spectrum of ecological options and substantially reduces the probability of unanticipated large-scale, irreversible change. The LMP option is the best hedge that technological man has against unforeseen environmental predicaments. According to Land Planner, David Bella, the strategy of preserve diversity requires decisions to preserve ecosystems to be as "definite, final, and binding" as decisions which lead to developing other ecosystems. RNA's considered in the Forest Plans and included in the selected alternative can be established with a minimum of paper work.

8. Does Forest management receive benefits from RNA's?

Unlike commodity-oriented "production" lands, RNA's do not directly generate revenues or lessen social-political pressures for short-term resource use. But real benefits are realized from RNA's through research applications leading to better management. One of the best known examples concerns snag management for wildlife. Old-growth ecosystems from (among other places) RNA's in the Pacific Northwest have led to this improved Forest practice. Other examples include integrated pest management (for which the complex, unmodified ecosystems within RNA's are sometimes essential), genetic enrichment of depleted ecosystems, and quality control of managed, production-oriented ecosystems by means of monitoring from "baseline" RNA ecosystems. Numerous plants of high range management value (high scorecard rating especially for commodity conditions) occur as naturally sustained populations within certain RNA's. These range plants within the RNA network give management opportunities for restoration, mitigation, or other genetically oriented range improvement practices. Similar opportunities exist for improved timber management based upon genetics and populations of tree ecotypes within forested RNA's. In general, the biota of these research-oriented ecosystems comprise a genetic supermarket for future management opportunities on adjacent modified lands of similar environments. At local levels each RNA gives insight into the quality of environment as a whole, the kinds of environments we would like to establish, modify, or extend, and management opportunities to achieve such goals.

Indeed, for some land managers the valuable genetic reserves within RNA ecosystems is temptation for direct exploitation as commodities, especially in pervasively depleted regions. This can, or may, lead to irreversible, largescale, and possibly undesirable modifications indicated in (7). The rarer the formerly widespread ecosystem, the more critical becomes the argument for protection and study, and the more beneficial is the future management opportunity based upon the resources available in protected areas.

9. How should RNA's be considered in various alternatives presented in Forest Plans?

RNA's are targeted ecosystems that require representation Nationally or Regionally. Specific opportunities for representation have been identified on each Forest. The ecosystem representation needs to be included in each alternative of the Forest Plan. The variation in alternatives can include a range of size options between 300 and 1200 acres or alternative locations on the Forest which offer equally good representation.

As a practical matter, most Forests have few options which will meet representation needs because of extensive resource utilization.

We must remember that maintaining ecological diversity and benchmarks is perhaps more important in commodity-oriented alternatives.

10. How will we avoid developing duplicate representations between Forests?

The RNA Committee and Task Group have been aware of this potential problem. They have carefully considered needs on a Region-wide basis while reviewing Forest proposals. Currently, all proposed areas represent a significant ecosystem difference, and thus, are not duplicates. As Forest Plans are approved the Regional Forester will consider the uniqueness of representations again.

Appendix C

Forest Contacts and Research Coordinators

Forest	Established Research Natural Area	District	Forest Contact	Research Coordinator
Apache-Sitgreaves	Phelps Cabin	Springerville	Forest Planner (Vearle Haynes) 333-4301 P.O. Box 640 Springerville, AZ 85938	Research Forester (Gerald Gottfried) 765-7315 Forestry Sciences Lab Northern Arizona University Flagstaff, AZ 86001
Carson NF			Soil and Water Staff (Bill Moehn) 758-2238 Forest Service Bld. P.O. Box 558 Taos, NM 85751	
Cibola NF			Office of Information (Lee Singer) 766-2185 10308 Candelaria Albuquerque, NM 87112	
Coconino NF	Casner Canyon	Sedona	Wildlife Biologist (Greg Goodwin) 766-7436 2323 E. Greenlaw Lane Flagstaff, AZ 86001	Range Scientist (Duane Knipe) 261-4365 Forestry Sciences Lab Arizona State University Tempe, AZ 85281
	G. A. Pearson	Flagstaff		Research Forester (Sally Haase) 765-7315 Forestry Sciences Lab Northern Arizona University Flagstaff, AZ 86001
	West Fork Oak Creek	Flagstaff		Research Forester (Pat Heidmann) 765-7315 Forestry Sciences Lab Northern Arizona University Flagstaff, AZ 86001
	San Francisco Peaks	Flagstaff		Research Forester (Sally Haase) 765-7315 Forestry Sciences Lab Northern Arizona University Flagstaff, AZ 86001
Coronado NF	Butterfly Peak	Santa Catalina	Lands (Mike Borens) 762-6239 Federal Building 301 West Congress Tuscon, AZ 85701	Research Forester (Michael Harrington) 261-4365 Forestry Sciences Lab Arizona State University Tempe, AZ 85281
	Elgin	Sierra Vista		Project Leader (Dave Patton) 261-4365 Forestry Sciences Lab Arizona State University Tempe, AZ 85281
	Goodding	Nogales		Research Wildlife Biologist (Bob Szaro) 261-4365 Forestry Sciences Lab Arizona State University Tempe, AZ 85281

Appendix C-continued

Forest	Established Research Natural Area	District	Forest Contact	Research Coordinator
	Goudy Canyon	Safford		Research Wildlife Biologist (Bob Szaro) 261-4365 Forestry Sciences Lab Arizona State University Tempe, AZ 85281
	Pole Bridge Canyon	Douglas		Research Wildlife Biologist (Bob Szaro) 261-4365 Forestry Sciences Lab Arizona State University Tempe, AZ 85281
	Santa Catalina	Santa Catalina		Research Forester (Michael Harrington) 261-4365 Forestry Sciences Lab Arizona State University Tempe, AZ 85281
Gila NF	Gila River	Silver City	Range and Wildlife Staff (Hugh Thompson) 388-1986 2610 North Silver St. Silver City, NM 88061	Range Scientist (Al Medina) 261-4365 Forestry Sciences Lab Arizona State University Tempe, AZ 85281
Kaibab NF			Range and Wildlife Staff (Vernon Zarlingo) 635-2681 800 S. 6th St. Williams, AZ 86046	
Lincoln NF			Forest Planner (Ed Wood) 437-6030 Federal Building 11th and New York Alamogordo, NM 88310	
Prescott NF			Range and Wildlife Staff (C. D. Warrick) 445-1762 344 South Cortez St. P.O. Box 2549 Prescott, AZ 86302	
Santa Fe NF	Monument Canyon	Jemez	Forest Planner (Eugene Rockey) 476-1945 988-6945 P.O. Box 1689 Santa Fe, NM 87501	Project Leader (Earl Aldon) 474-2384 2205 Columbia, SE Albuquerque, NM 87106
Tonto NF	Bush Highway	Mesa	Range and Wildlife Staff (Dave Stewart) 261-4170 102 S. 28th St. P.O. Box 29070 Phoenix, AZ 85038	Research Wildlife Biologist (Keith Severson) 261-4365 Forestry Sciences Lab Arizona State University Tempe, AZ 85281